4.0 PLAN IMPLEMENTATION

Within plan implementation, there are several key individuals and organizations that are introduced and discussed in detail. For clarity, the following abbreviated terms apply:

- Assistant Secretary of the Army for Civil Works: the Assistant Secretary
- U.S. Army Corps of Engineers, Headquarters: Headquarters
- U.S. Army Corps of Engineers, Mississippi Valley Division: the Division
- U.S. Army Corps of Engineers-Mississippi Valley Division, New Orleans District: the District
- Coastal Louisiana Ecosystem Protection and Restoration Task Force: the Task Force
- State of Louisiana: the state

The State of Louisiana, acting through the LDNR, is the non-Federal cost share sponsor.

4.1 EVALUATION OF PBMO IMPLEMENTATION

Sequencing and scheduling of the alternative plan that bests meets objectives (PBMO) was required to determine an implementation plan. This implementation plan evaluation is based on the ability to meet the near-term (5 to 10 years) and critical needs. While these criteria identified the features that would comprise the most appropriate near-term restoration effort, the sequencing of the PBMO features needed to consider implementation parameters and constraints and identify the most effective means of executing the plan. The features of the PBMO were sequenced based on the highest capability for achieving construction approval first and then scheduled according to resource requirements and capabilities. Representatives of the cost share partners from the District and the LDNR, representing the state, established a set of assumptions and rules to sequence and schedule implementation of all components of the plan. The results of this evaluation are discussed in greater detail in a later part of this section.

4.1.1 Assumptions and Rules

There were five major assumptions made in the preparation of the implementation schedule prepared for this report. They are related to project authorizations, large-scale and long-term studies, demonstration projects, and funding and manpower resources. These are described in the following bullets. A set of sequencing rules was also developed to guide development of the implementation schedule. These rules are also described in more detail in the following bullets.

Assumptions

- Near-term critical restoration feature feasibility-level decision documents and feasibility studies could begin in October 2004 based upon existing authority;
- Large-scale and long-term studies could begin in October 2004 based upon existing authority;
- Feasibility-level decision document preparation for demonstration projects could begin in January 2005 based upon successful completion of the Chief's Report in December 2004 and future WRDA authorization;
- The annual cost shared execution capability of the District and non-Federal sponsor would be approximately $200 million per year on average; and
- All components should have construction initiated within the next 10 years.

Sequencing Rules

- Near-term critical restoration features that exhibit high degree of design development and have initiated NEPA compliance documentation (EIS)
- Near-term critical restoration features that if delayed, could result in "Loss of Opportunity" to restore a critical needs area;
- Modifications to existing structures already identified as major opportunities for contribution to LCA objectives; and
- Qualitative valuations that resulted in determining the features resident in the PBMO also allow for a prioritized ordering of the remaining features.

4.1.2 Implementation Scheduling Evaluation

Once the implementation sequence for the PBMO components had been determined, the Federal and State cost share partners began development of the 10-year implementation schedule. Based on the assumptions and rules for scheduling of plan components, all PBMO projects could not be implemented simultaneously. In addition, discussions with the non-Federal sponsor led to the conclusion that the total annual project expenditures would be limited to approximately $200 million per year on average (attachment 3 NON-FEDERAL SPONSOR FINANCIAL CAPABILITY). The inclusion of all plan components would force the implementation schedule to either exceed the average available funding limitation, or would result in initial construction of some features in the PBMO being delayed beyond the 10-year planning period.

To facilitate the initial efforts in sequencing the near-term critical features, a number of those features that had been grouped were considered separately to identify if they met the specific sequencing rules. The intent of grouping features was to indicate that those features required common consideration and analysis during the decision document phase. The assumption in considering implementation of grouped features separately is that the initial feature sequenced in any group would need to consider and reconcile the combined effects of the specific group. The ultimate implementation sequence of grouped features is not a dependent function if they have been properly assessed and scaled from the outset.

The critical near-term features of the PBMO were also reviewed in consideration of the 10-year timeframe to identify any additional conflicts or efficiencies in implementing the PBMO not captured by the established assumptions and sequencing rules. This review revealed that the Penchant Basin Restoration feature could be implemented more effectively by allowing the feature to proceed to approval under the CWPPRA program. The sequencing for this feature was identified as being beyond year 5 in the near-term plan. Construction approval and funding through the CWPPRA program could potentially be achieved for this feature in 2 to 3 years. As noted above, it is assumed that consideration of this feature, in conjunction with other hydrologic modification features with which it was grouped, would be performed prior to the implementation of the any of these features.

The review also revealed a consistent potential near-term conflict between the Lac Des Allemands Reintroduction features and the large-scale, long-range Third Delta study. The potential for hydrologic conflicts, or possibly more effective means of achieving the benefits through the larger feature, indicated that these near-term features should not be initiated until after completion of the large-scale study.

Considering this information, it was deemed reasonable to consider these features last in the sequencing. As a result, the Penchant Basin Restoration, and Lac Des Allemands were placed last in the sequencing and resulted in the inability to execute these features within the 10-year near-term timeframe.

Because beneficial use has been added as a program-wide component for this restoration technique, the beneficial use of dredged material from the Calcasieu Ship Channel would be evaluated for implementation as part of the larger beneficial use program. Evaluation of the Calcasieu River project, as part of the overall beneficial use program, would ensure that the most effective and feasible projects would be implemented more quickly.

Utilizing the sequencing rules, and the considerations discussed above the elements of the PBMO were sequenced as shown in **table MR4-1**.

Table MR4-1. Sequenced PBMO Components.

Near-term Critical Restoration Features

- MRGO Environmental Restoration features
- Small Diversion at Hope Canal
- Barataria Basin Barrier Shoreline Restoration
- Small Bayou Lafourche Reintroduction
- Medium Diversion with dedicated dredging at Myrtle Grove
- Multi-purpose operation of Houma Navigation Canal Lock
- Terrebonne Basin Barrier Shoreline Restoration
- Maintain Land Bridge between Caillou Lake and Gulf of Mexico
- Small Diversion at Convent / Blind River
- Increase Amite River Diversion Canal Influence by gapping banks
- Medium Diversion at White's Ditch
- Stabilize Gulf Shoreline at Point Au Fer Island
- Convey Atchafalaya River water to Northern Terrebonne Marshes
- Modification of Caernarvon Diversion
- Modification of Davis Pond Diversion
- Penchant Basin Restoration
- Lac Des Allemands Reintroductions
- Calcasieu River Beneficial Use

The result of the scheduling evaluation effort was the identification of the set of near-term critical features that met sorting and critical need criteria, and could be implemented within the time and funding parameters identified for the near-term effort. This subset of the PBMO, along with other long-term and programmatic elements, was designated as the LCA Plan in the draft report prepared for public review and now represents the major features of the near-term critical restoration effort identified in the LCA Plan. A list of the near-term critical features contained in this subset is shown in **Table MR4-2**, following the discussion of authorization process considerations.

4.1.3 Project Authorization Process Analysis

After identifying the subset of near-term critical features to be included in the LCA Plan the Federal and state cost-share partners evaluated alternative implementation scenarios for all the components of the LCA Plan using two different authorization procedures:

(1) Specific Congressional authorization for all critical features with implementation subject to approval of feasibility-level decision documents by the Secretary of the Army (a process hereinafter referred to as "conditional authorization" elsewhere in the report;

(2) Future Congressional construction authorization for all critical features (i.e., the typical WRDA authorization process used for authorization of water resources projects, in which investigations are performed to complete feasibility reports and, upon completion, submitted for construction authorization under future WRDAs).

These two authorization processes have in common the requirement, which applies to all components of the LCA Plan, for completion and approval of detailed decision and NEPA compliance documents prior to the initiation of construction. In the case of the conditional authorization, the necessary Congressional authorization to proceed would be provided conditional to the approval of the required documents by the Secretary of the Army. For future Congressional construction authorization, approval of all required documents by the Secretary of the Army would be completed prior to submission to Congress, which then would provide final approval and authorization for construction at one time.

In this first scheduling iteration, the comparison of the implementation schedule results indicate that the major difference between the authorization scenarios was in the execution capability within the first five years. Both scenarios indicate execution at an annual capability averaging approximately $200 million beyond year 5.

Another iteration was conducted to investigate the effects of conditional authorization for only the five most highly critical features that met the first sequencing rule. Substantial design development and NEPA compliance efforts have been undertaken for these projects. Based on these considerations, the Federal and state cost share partners determined that these features could be ready for construction approval prior to the next opportunity for authorization. This scheduling iteration identified that conditional authorization for only the top five restoration features, with future Congressional construction authorization for the remaining 10 features, provided the same increased execution capability as the conditional authorization for all 15 restoration features. It became apparent that annual funding limitations, as well as the typical process of seeking construction approval under WRDA authorization, limited the plan's execution. The implementation scenario supported by conditional authorization for the top five restoration features is optimal for expediting implementation of features that address the most urgent needs of the coastal area. This scenario would facilitate the most effective and efficient implementation leading to the identification of the LCA plan. Without conditional authority, both the approval to proceed, and ability to budget for implementation, would setback the construction and operation of these critical restoration features.

Table MR 4-2 shows the LCA Plan near-term critical features recommended for conditional authorization and approval with future Congressional authorization.

Table MR 4-2. Scheduled LCA Plan Components.

Recommended for Conditional Authorization
Near-term Critical Restoration Features • MRGO Environmental Restoration features • Small Diversion at Hope Canal • Barataria Basin Barrier Shoreline Restoration, Caminada Headland, Shell Island • Small Bayou Lafourche reintroduction • Medium diversion with dedicated dredging at Myrtle Grove
Recommended for Approval With Future Congressional Construction Authorization
Other Near-term Critical Restoration Features • Multi-purpose operation of Houma Navigation Canal Lock • Terrebonne Basin Barrier Shoreline Restoration • Maintain land bridge between Caillou Lake and Gulf of Mexico • Small Diversion at Convent / Blind River • Increase Amite River Diversion Canal Influence by gapping banks • Medium diversion at White's Ditch • Stabilize Gulf Shoreline at Point Au Fer Island • Convey Atchafalaya River water to Northern Terrebonne Marshes • Modification of Caernarvon Diversion • Modification of Davis Pond Diversion

4.2 SUMMARY OF THE LCA PLAN COMPONENTS AND IMPLEMENTATION SCHEDULE

4.2.1 Description of the LCA Plan

As stated in section 3.1 PLANNING CONSTRAINTS, the resolution of S&T uncertainties requires continued science and technology development supported by demonstration projects. In addition, there is coastwide beneficial use of dredged material, as well as potential modifications of existing water resource projects that may offer the opportunities to advance restoration. To better achieve completeness and effectiveness, the PDT incorporated these two additional plan components for programmatic authorization. This resultant multi-component LCA Plan represents the best near-term approach for addressing ecosystem degradation in Louisiana. The LCA program relies on Congressional approval of the LCA Plan as a framework for conditional and future Congressional construction authorization actions. Components of the LCA Plan are:

- Conditional authorization for implementation of five near-term critical restoration features for which construction can begin within 5 to 10 years, subject to approval of feasibility-level decision documents by the Secretary of the Army;
- Programmatic Authorization of a Science and Technology (S&T) Program;

- Programmatic Authorization of Science and Technology Program Demonstration Projects;
- Programmatic Authorization for the Beneficial Use of Dredged Material;
- Programmatic Authorization for Investigations of Modification of Existing Structures;
- Approval of 10 additional near-term critical restoration features and authorization for investigations to prepare necessary feasibility-level reports to be used to present recommendations for potential future Congressional authorizations (hereinafter referred to as "Congressional authorization"); and
- Approval of investigations for assessing six potentially promising large-scale and long-term restoration concepts.

Figure MR 4-1 and **tables MR 4-3a** and **MR 4-3b** list the components of the LCA Plan.

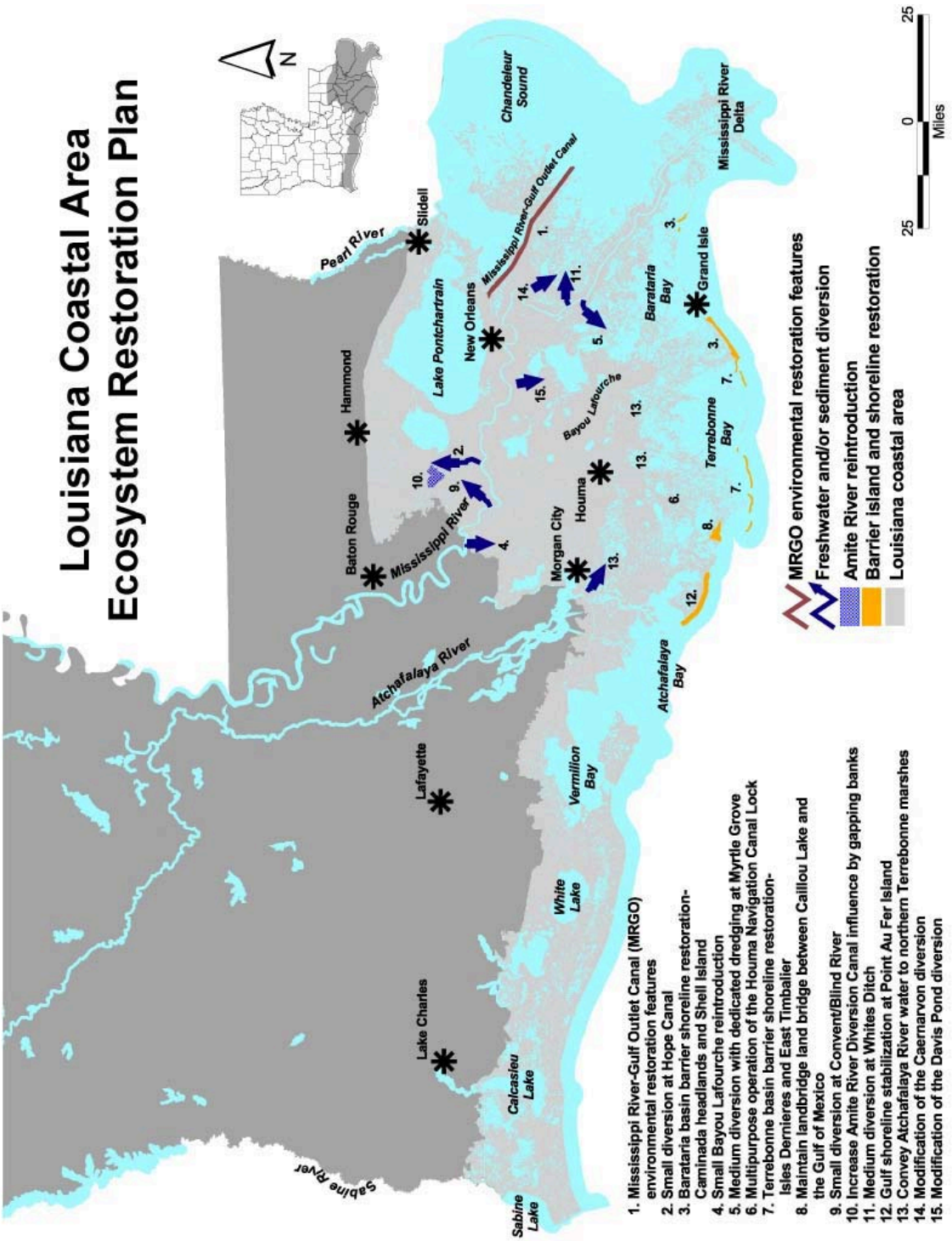

Figure MR 4-1. Critical Near-Term Restoration Features of the LCA Plan.

Table MR 4-3a. Components of the LCA Plan.

Recommended for Conditional or Programmatic Authorization
1. Conditional Authorization of Near-term Critical Restoration Features • MRGO Environmental Restoration Features • Small Diversion at Hope Canal • Barataria Basin Barrier Shoreline Restoration • Small Bayou Lafourche Reintroduction • Medium Diversion with Dedicated Dredging at Myrtle Grove 2. Programmatic Authorization of the S&T Program 3. Programmatic Authorization of Demonstration Projects 4. Programmatic Authorization for the Beneficial Use of Dredged Material 5. Programmatic Authorization to Initiate Investigations of Modifications of Existing Water Control Structures

Table MR4-3b. Components of the LCA Plan.

Recommended for Approval With Future Congressional Construction Authorization
6. Other Near-term Critical Restoration Features • Multi-purpose operation of Houma Navigation Canal Lock • Terrebonne Basin Barrier Shoreline Restoration • Maintain land bridge between Caillou Lake and Gulf of Mexico • Small Diversion at Convent / Blind River • Increase Amite River Diversion Canal Influence by gapping banks • Medium diversion at White's Ditch • Stabilize Gulf Shoreline at Point Au Fer Island • Convey Atchafalaya River water to Northern Terrebonne Marshes • Modification of Caernarvon Diversion • Modification of Davis Pond Diversion 7. Large-scale and Long-term Concepts Requiring Detailed Study • Mississippi River Hydrodynamic Study • Mississippi River Delta Management Study • Third Delta Study • Chenier Plain Freshwater and Sediment Management and Allocation Reassessment Study • Acadiana Bays Estuarine Restoration Study • Upper Atchafalaya Basin Study

4.2.2 Sequencing of the LCA Plan

Tables MR 4 4a-d show the implementation schedule for the LCA Plan, developed with conditional authorization for five critical features, programmatic authorization features, and future Congressional construction authorization for the other 10 near-term critical features.

Table MR 4-4a: The LCA Plan Implementation Schedule

Project: 101204
Time Now: 10/01/04
Start: 10/01/04
Finish: 09/29/23
Run: 10/15/04

The LCA Plan Implementation Schedule

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Planned
Critical
Milestone
Progress

ID	Activity Desc.	Duration	Early Start	Early Finish
A01A	MRGO Environmental Restoration Features (SP1) DD	390d	01/10/05	07/07/06
A01B	MRGO Environmental Restoration Features (SP1) PED	520d	07/10/06	07/04/08
A01C	MRGO Enviro. Rest. Construction	1430d	07/07/08	12/27/13
A01C2	MRGO Enviro. Rest. E&D, S&A	1430d	07/07/08	12/27/13
A01C3	MRGO Enviro. Rest. RE	1430d	07/09/07	12/28/12
A01C4	MRGO Enviro. Rest. Monitoring	1300d	12/30/13	12/21/18
B02A	Small Diversion at Hope Canal (SP1) DD	650d	04/04/05	09/28/07
B02B	Small Diversion at Hope Canal -PED	520d	10/01/07	09/25/09
B02C	Div. at Hope Canal Construction	1300d	09/28/09	09/19/14
B02C2	Div. at Hope Canal E&D, S&A	1300d	09/28/09	09/19/14
B02C3	Div. at Hope Canal RE	1300d	09/29/08	09/20/13
B02C4	Div. at Hope Canal Monitoring	1300d	09/22/14	09/13/19
C03A	Barataria Basin Barrier Shore Rest. -Caminada ,Shell Is. SP2	1415d	05/01/00	09/30/05
C03B	Barat Basin Barrier Shore Rest. Cam., Shell-DD	390d	04/04/05	09/29/06
C03BA	Barat. Basin Barrier Shore Rest. Cam., Shell-PED	520d	10/02/06	09/26/08
C03C	Barat Basin Barrier Shore. Rest. Cam, Shell Is Const	1040d	09/29/08	09/21/12
C03C2	Barat Basin Barrier Shore. Rest. Cam, Shell Is E&D, S&A	1040d	09/29/08	09/21/12
C03C3	Barat Basin Barrier Shore. Rest. Cam, Shell Is RE	1040d	10/01/07	09/23/11
C03C4	Barat Basin Barrier Shore. Rest.Cam,Shell Monitoring	1300d	09/24/12	09/15/17
D06A	Small Bayou LaFourche Reintroduction (SP3)-DD	780d	01/10/05	01/04/08
D06B	Small Bayou LaFouche Reintroduction (SP3)-PED	520d	01/07/08	01/01/10
D06C	Small Bayou La Fourche Reintro Construction	1820d	01/04/10	12/23/16
D06C2	Small Bayou La Fourche Reintro E&D, S&A	1820d	01/04/10	12/23/16
D06C3	Small Bayou La Fourche Reintro RE	1820d	01/05/09	12/25/15
D06C4	Small Bayou LaFouche Reintro Monitoring	1300d	12/26/16	12/17/21
E07A	Medium Diversion w/ Dedicated Dredging at Myrtle Grove- DD	780d	04/04/05	03/28/08
E07B	Medium Diversion W/ Dedicated Dredging at Myrtle Grove-PED	520d	03/31/08	03/26/10
E07C	Medium Diversion at Myrtle Grove Construction	1560d	03/29/10	03/18/16
E07C2	Medium Diversion at Myrtle Grove E&D, S&A	1560d	03/29/10	03/18/16
E07C3	Medium Diversion at Myrtle Grove RE	1560d	03/30/09	03/20/15
E07C4	Medium Diversion at Myrtle Grove Monitoring	1300d	03/21/16	03/12/21
FST01	Science & Tech Program FY05-FY15	2537d	01/10/05	09/30/14

Table MR 4-4b: The LCA Plan Implementation Schedule

Project: 101204
Time Now: 10/01/04
Start: 10/01/04
Finish: 09/29/23
Run: 10/15/04

The LCA Plan Implementation Schedule

Planned
Critical
Milestone
Progress

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ID	Activity Desc.	Duration	Early Start	Early Finish
GDEMO5C	Demo Projects-DD	1695d	04/04/05	09/30/11
GDEMO5D	Demo Projects-PED	1565d	10/02/06	09/28/12
GDEMO5E	Demo Projects-RE	1827d	10/01/07	09/30/14
GDEMO5F	Demo Projects-CONSTRUCTION	2350d	09/29/08	09/29/17
GDEMO5G	Demo Projects-MONITORING	3135d	09/27/10	09/30/22
GDEMO5H	Demo Projects-E&D	2350d	09/29/08	09/29/17
GDEMO5I	Demo Projects-S&A	2350d	09/29/08	09/29/17
GDEMO5J	Demo Projects-MONITORING RPT	3138d	09/21/11	09/29/23
HPGMA	Prog. Auth. for Beneficial Use of Dredged Mtrl.-DD	2738d	04/04/05	09/30/15
HPGMB	Prog. Auth. for Beneficial Use Construction	2340d	04/03/07	03/21/16
HPGMB2	Prog. Auth. for Beneficial Use RE	2340d	04/03/06	03/20/15
IMODA	Investigation of Mod to Existing Structures-Other Opportun.	2410d	07/05/05	09/29/14
J08A	Multi-Purpose Ops of Houma Nav. Canal (HNC) Lock-DD	390d	07/06/11	01/01/13
J08B	Multi-Purpose Ops of Houma Nav. Canal (HNC) Lock PED	260d	01/02/13	12/31/13
J08B2	Multi-Purpose Ops of Houma Nav. Canal (HNC) Lock RE	520d	01/02/13	12/30/14
J08B3	Multi-Purpose Ops of Houma Nav Canal Lock E&D S&A	520d	01/01/14	12/29/15
J08B4	Multi-Purpose Ops of Houma Nav. Canal Lock-Monitoring	1300d	12/30/15	12/22/20
K09A	Terr. Basin Barrier Shore. Restoration -DD	520d	10/01/10	09/27/12
K09B	Terr. Basin Barrier Shore. Restoration PED	520d	09/28/12	09/25/14
K09C	Terr. Basin Barrier Shore. Restoration Construction	726d	09/26/14	07/07/17
K09C2	Terr. Basin Barrier Shore. Restoration E&D, S&A	726d	09/26/14	07/07/17
K09C3	Terr. Basin Barrier Shore. Restoration RE	726d	09/27/13	07/08/16
K09C4	Terr. Basin Barrier Shore. Rest. Monitoring	1300d	07/10/17	07/01/22
L10A	Maintain Land Bridge b/t Caillou Lk. and Gulf of Mexico-DD	520d	10/01/09	09/28/11
L10B	Maintain Land Bridge b/t Caillou Lake and Gulf of Mexico-PED	520d	09/29/11	09/25/13
L10C	Maintain Land Bridge b/t Caillou Lake & Gulf Construction	520d	09/26/13	09/23/15
L10C2	Maintain Land Bridge b/t Caillou Lake & Gulf E&D, S&A	520d	09/26/13	09/23/15
L10C3	Maintain Land Bridge b/t Caillou Lake & Gulf RE	520d	09/27/12	09/24/14
L10C4	Maintain Land Bridge b/t Caillou Lk & Gulf Monitoring	1300d	09/24/15	09/16/20
M11A	Small Diversion at Convent / Blind River DD	780d	10/01/07	09/24/10
M11B	Small Diversion at Convent/Blind River PED	520d	09/27/10	09/21/12
M11C	Small Diversion at Convent/Blind River Construction	1300d	09/24/12	09/15/17

Table MR 4-4c: The LCA Plan Implementation Schedule

Project: 101204
Time Now: 10/01/04
Start: 10/01/04
Finish: 09/29/23
Run: 10/15/04

The LCA Plan Implementation Schedule

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Planned
Critical
Milestone
Progress

ID	Activity Desc.	Duration	Early Start	Early Finish
M11C2	Small Diversion at Convent/Blind River E&D, S&A	1300d	09/24/12	09/15/17
M11C3	Small Diversion at Convent/Blind River RE	1300d	09/26/11	09/16/16
M11C4	Small Diversion at Convent/Blind River Monitoring	1300d	09/18/17	09/09/22
N12A	Increase Amite River Influence by Gapping Bank (SP1)	390d	10/01/07	03/27/09
N12B	Increase Amite River Influence PED	390d	03/30/09	09/24/10
N12C	Increase Amite River Influence Construction	390d	09/27/10	03/23/12
N12C2	Increase Amite River Influence E&D, S&A	390d	09/27/10	03/23/12
N12C3	Increase Amite River Influence RE	390d	09/28/09	03/25/11
N12C4	Increase Amite River Influence Monitoring	1300d	03/26/12	03/17/17
O13A	Medium Diversion at Whites Ditch (SP1)	780d	10/01/08	09/27/11
O13B	Medium Diversion at Whites Ditch PED	520d	09/28/11	09/24/13
O13C	Medium Diversion at Whites Ditch Construction	1300d	09/25/13	09/18/18
O13C2	Medium Diversion at Whites Ditch E&D, S&A	1300d	09/25/13	09/18/18
O13C3	Medium Diversion at Whites Ditch RE	1300d	09/26/12	09/19/17
O13C4	Medium Diversion at Whites Ditch Monitoring	1300d	09/19/18	09/12/23
P14A	Gulf Shore. Stabilization at Pt. Au Fer Island (SP3)	484d	10/01/09	08/09/11
P14B	Gulf Shore. Stabilization at Pt. Au Fer Island-PED	780d	08/10/11	08/05/14
P14C	Gulf Shore. Stabilization at Pt. Au Fer Is. Construction	352d	08/06/14	12/10/15
P14C2	Gulf Shore. Stabilization at Pt. Au Fer Is. E&D, S&A	352d	08/06/14	12/10/15
P14C3	Gulf Shore. Stabilization at Pt. Au Fer Is. RE	352d	08/07/13	12/11/14
P14C4	Gulf Shore. Stabilization at Pt. Au Fer Is. Monitoring	1300d	12/11/15	12/03/20
Q15A	Convey Atch. River to Terrebonne Marsh via Small Div.	630d	10/01/07	02/26/10
Q15B	Convey Atch. River to Terrebonne Marsh-PED	520d	03/01/10	02/24/12
Q15C	Convey Atch. River to Terrebonne Marsh-Construction	1560d	02/27/12	02/16/18
Q15C2	Convey Atch. River to Terrebonne Marsh-E&D S&A	1672d	02/27/12	07/24/18
Q15C3	Convey Atch. River to Terrebonne Marsh-RE	1672d	02/28/11	07/25/17
Q15C4	Convey Atch. River to Terr. Marsh Monitoring	1300d	02/19/18	02/10/23
R04A	Modification to Caernarvon Div (SP1) DD	520d	10/03/05	09/28/07
R04B	Modification to Caernarvon PED	520d	10/01/07	09/25/09
R04C	Modification to Caernarvon Div Construction	1040d	09/28/09	09/20/13
R04C2	Modification to Caernarvon Div E&D, S&A	1040d	09/28/09	09/20/13
R04C3	Modification to Caernarvon Div RE	1040d	09/29/08	09/21/12

Table MR 4-4d: The LCA Plan Implementation Schedule

Project: 101204
Time Now: 10/01/04
Start: 10/01/04
Finish: 09/29/23
Run: 10/15/04

The LCA Plan Implementation Schedule

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Planned
Critical
Milestone
Progress

ID	Activity Desc.	Duration	Early Start	Early Finish
R04C4	Modification to Caernarvon Div Monitoring	1300d	09/23/13	09/14/18
S05A	Mod. to Davis Pond Div. for Increased Sed.SP2 DD	520d	10/01/07	09/25/09
S05B	Mod. to Davis Pond Div. for Increase Sed. PED	520d	09/28/09	09/23/11
S05C	Modification to Davis Pond Diversion Construction	1040d	09/26/11	09/18/15
S05C2	Modification to Davis Pond Diversion E&D, S&A	1040d	09/26/11	09/18/15
S05C3	Modification to Davis Pond Diversion RE	1040d	09/27/10	09/19/14
S05C4	Modivication to Davis Pond Div. Monitoring	1300d	09/21/15	09/11/20
TLS1	Mississippi River Hydrodynamic Study	780d	04/04/05	03/28/08
TLS2	Third Delta (SP2 and 3)	1560d	01/10/05	12/31/10
TLS3	Upper Atchafalaya Basin Study w/Mod Old Riv Cont Struct Scm	660d	01/10/05	07/20/07
TLS4	Chenier Plain Freshwater Mgt. and Allocation Reassess. (SP4)	780d	10/03/05	09/26/08
TLS5	Miss. River Delta Mgt. Study (SP1 & 2)	990d	10/02/06	07/16/10
TLS6	Acadiana Bay Estuarine Restoration (SP3)	660d	10/02/06	04/10/09

4.2.3 Near-Term Critical Restoration Features

4.2.3.1 Cost Effectiveness of the Near-term Critical Component of the LCA Plan

Following the identification of the critical near-term features to be implemented in the near-term restoration effort the ecologic models were run in each subprovince. The specific purpose of this modeling effort was to enable the cost effectiveness of the near-term critical features of the LCA Plan to be comparatively assessed relative to the larger frame works from which they had been developed. With the existing cost information and the benefit output for the LCA Plan in each subprovince a comparison of the cost effectiveness of the LCA Plan versus the previously analyzed coast wide frameworks was made. The overlaying of the LCA Plan on the identified cost effective frontier indicates that three coast wide frameworks previously deemed to be cost effective would be eliminated from the frontier. The comparison of the LCA Plan versus these frameworks is provided in **table MR4-5**. The effected coastwide frameworks are shaded in the table.

Table MR 4-5
LCA Plan versus Final Array of Coast wide Frameworks
forming the Cost Effective Frontier

Plan	Subprovince Framework Codes	Average Annual Benefits*	Average Annual Costs
0000	No Action	0	$ -
1000	S1R1	219	22,910,914
2000	S1R2	1074	24,350,598
5000	S1M2	1873	32,838,902
7000	S1E1	1945	55,021,432
5010	S1M2, S3R1	1987	70,438,353
7010	S1E1, S3R1	2059	92,620,883
2100	S1R2, S2R1	2185	113,555,259
LCA Plan		**2865**	**55,921,000**
5100	S1M2, S2R1	2984	122,043,563
7100	S1E1, S2R1	3056	144,226,093
5110	S1M2, S2R1, S3R1	3098	159,643,014
10130	S1-3 N3*	3134	179,073,919
7110	S1E1, S2R1, S3R1	3170	181,825,544
7410	S1E1, S2M1, S3R1	3182	207,599,025
7002	S1E1, S2E3, S3M1	3202	542,511,742

*Based on a composite of land building, habitat suitability, and nitrogen removal.

A comparison of the cost effectiveness of the LCA Plan versus the final array of coast wide frameworks from which the LCA Plan was derived shows that the LCA Plan produces a lesser magnitude of output. However, the efficiency of the LCA Plan is comparable to that of the larger plans in the final array. The comparison of the LCA Plan and the final array of coast wide frameworks is presented in **table MR 4-6** and **figure MR 4-2.**

Table MR 4-6
LCA Plan and Final Array of Coast wide Frameworks

Plan	Subprovince Framework Codes	Average Annual Benefits ^	Average Annual Costs
LCA Plan		**2865**	**$ 55,921,000**
5610	S1M2, S2M3, S3R1	3094	171,479,754
5110	S1M2, S2R1, S3R1	3098	159,643,014
5410	S1M2, S2M1, S3R1	3110	185,416,495
10130	S1-3 N3*	3134	179,073,919
7610	S1E1, S2M3, S3R1	3166	193,662,284
7410	S1E1, S2M1, S3R1	3182	207,599,025
7002	S1E1, S2E3, S3M1	3202	542,511,742

*Plan developed by modification of plan 5110.
^Based on a composite of land building, habitat suitability, and nitrogen removal.

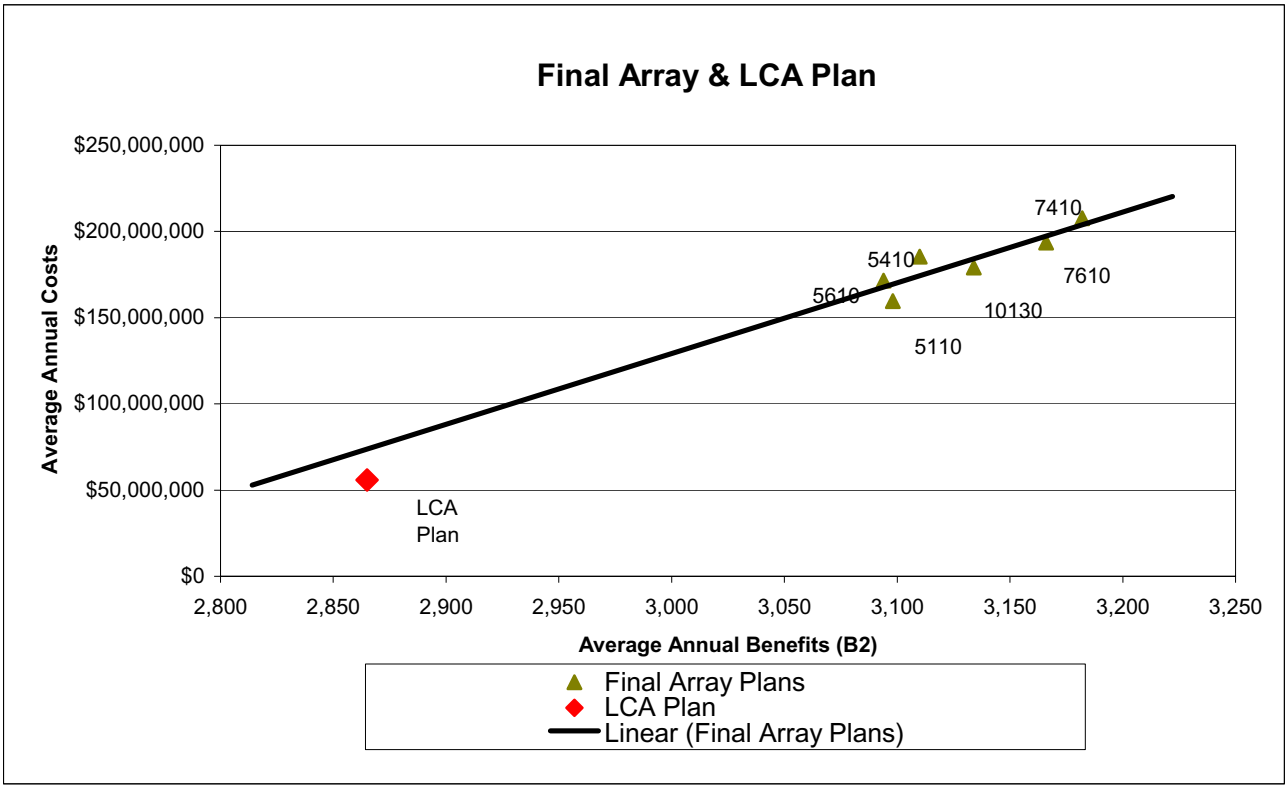

Figure MR 4-2 Effectiveness of the LCA Plan Relative to the Final Array of Coast Wide Frameworks

The ecologic model output for land building estimates that the plan would offset approximately 62.5 percent of the 462,000 acres projected to be lost within the coast under the no action alternative. The estimated land building for Subprovince 1 exceed projected no action losses. In Subprovinces 2 & 3 the models estimated that the LCA Plan prevented almost 50 percent of the expected losses in each basin. These estimates do not include any projects in Subprovince 4.

A comparison of the habitat suitability projected by the ecologic model for the LCA Plan indicates that increases in overall suitability in habitat for lower and moderate salinity species should generally occur in the Deltaic Plain subprovinces relative to no action. Subprovince 1 is an exception where lower salinity species are estimated to experience a slight decline in habitat with the LCA Plan, which is a reversal in trend as compared to the coast wide framework effects. This reversal is also apparent for moderate salinity species in Subprovince 1 with a negative habitat trend being reflected by the coast wide frameworks. In Subprovince 2, the coast wide frameworks project a slightly higher improvement for lower salinity species than with the LCA Plan. In Subprovince 3, there is no difference in projected trends from the LCA Plan to the coast wide frameworks.

For higher salinity species, the projected trends for all three subprovinces indicate slight to moderate decline in habitat suitability. The comparison of the effect of the LCA Plan versus the coast wide frameworks indicates that the habitat decline would be somewhat reduced for the LCA Plan. The models estimate that the largest effects would occur in these saline habitats. The potential declines of approximately 35 percent in these habitat types are heavily influenced by oyster habitat suitability factors.

The ecologic model also estimates the capability of restoration plans for nitrogen removal from Mississippi River flows. A target for this effectiveness is expressed as a fraction of 30 percent of the annual nitrogen load transported by the river. In relation to the coast wide frameworks, the potential of the LCA Plan to meet this objective is reduced due to the exclusion of larger-scale diversions from the near-term restoration plan.

Although the model results indicate that the LCA Plan would offset roughly 62.5 percent of the projected land loss in the future, significant need still exists to offset the past loss of approximately 1.2 million acres and subsequent reduction in overall ecosystem quality.

4.2.3.2 Conditional authority for implementation of certain near-term critical restoration features

Feasibility-level decision documents would be developed for each of the initial five near-term critical restoration features. These feasibility-level decision documents would document planning; engineering and design; real estate analyses; and supplemental requirements under the NEPA. It is recommended that Congress authorize implementation of the five near-term restoration features described below, subject to review and approval of the feasibility-level decision documents by the Secretary of the Army.

The feature descriptions below explain the justification for the requested conditional authorization for the initial five near-term critical restoration features. All of these features have a basis in cost effectiveness and in their value in addressing critical natural and human ecological needs. These five critical near-term features present a range of effects essential for success in restoring the Louisiana coast. The benefits provided by these features include the sustainable reintroduction of riverine resources, rebuilding of wetlands in areas at high risk for future loss, the preservation and maintenance of critical coastal geomorphic structure, and perhaps most importantly, the preservation of critical areas within the coastal ecosystem, and the opportunity to begin to identify and evaluate potential long-term solutions.

Based on a body of work both preceding and including this study effort, the PDT produced an estimate of average annual costs and benefits for these five features. Benefits were estimated during previous investigations of these features using a community based Habitat Evaluation Procedure (HEP) model developed by the USFWS specifically for the CWPPRA program. This model was entitled the Wetland Value Assessment (WVA) and was geared toward optimal species common parameters over a range of habitats. The model is driven by input based on multi-user professional judgment supported by available habitat data and user observation. The users must specifically prescribe the area and level of expected effect. This model expands upon professional judgment by formalizing a consensus, and standardizing methodology. The model does not mathematically extrapolate biologic response over the defined spatial extent of the project area in the manner of the desktop or a numeric model. In this regard, the WVA has some limitation in projecting beneficial output. While the desktop model is capable of capturing far reaching secondary effects related to altered hydrology or riverine input transported through a larger system, the WVA can be limited by the user defined areas, and estimated levels, of effect.

Composite information based on WVA output for these features shows that average annual environmental output for this conditionally authorized feature package would be on the order of 22,000 habitat units (HU) at an average annualized cost of $2,700 per unit provided. Summaries of the five near-term critical features presented for conditional authorization are presented on the following pages. Detailed descriptions and background information for these five features is provided in attachment 4 to the Main Report.

4.2.3.2.1 *Mississippi River Gulf Outlet (MRGO) environmental restoration features*

The Lake Borgne estuarine complex is deteriorating and recent analysis indicates that the rate of wetland loss in the area is accelerating. Rapid action is required to protect the integrity of the southern Lake Borgne shoreline and to prevent continued erosion of the Mississippi River Gulf Outlet (MRGO) channel banks from ocean going vessel wakes. Additional ecosystem restoration features are required to address serious ecological problems developing in the surrounding parts of the estuary. Without action, critical landscape components that make up the Lake Borgne estuary would be lost and future efforts to restore other parts of the ecosystem would be much more difficult and expensive if not impossible.

Construction and maintenance of the MRGO caused widespread wetland loss and damage to estuarine habitats from the outer barrier islands in the lower Chandeleur chain up to cypress forests and tidal fresh marshes in the western reaches of the Lake Borgne Basin. During construction of the MRGO, dredging and filling destroyed more than 19,000 acres of wetlands, and an important hydrologic boundary was breached when the channel cut through the ridge at Bayou La Loutre.

After the MRGO was completed, significant habitat shifts occurred because the impacted area converted to a higher salinity system with the influx of saltwater through ridges and marsh systems that were severed or destroyed during channel construction. Continued operation of the MRGO results in high rates of shoreline erosion from ship wakes, which destroy wetlands and threatens the integrity of the Lake Borgne shoreline and adjacent communities, infrastructure, and cultural resources. In addition, severe erosion of the MRGO channel continues to facilitate the transition of the upper Pontchartrain Basin estuary toward a more saline system.

Annual erosion rates in excess of 35 feet along the north bank of the MRGO result in the direct loss of approximately 100 acres of shoreline brackish marsh every year and additional losses of interior wetlands and shallow ponds as a result of high tidal ranges and rapid water exchange through the modified watercourse system. These vegetated habitats and shallow waters are important for estuarine biological resources and serve as critical habitat for the threatened Gulf sturgeon.

Erosion and saltwater intrusion are also impacting ridge habitat that is important for mammals, reptiles, and birds. The highest rates of erosion in the area occur along the north bank of the MRGO channel. The southern shoreline of Lake Borgne is eroding at approximately 15 feet per year resulting in the loss of 27 acres of wetlands per year. Continuing erosion along the channel and the shoreline of Lake Borgne is threatening to breach the lake/marsh rim, which would result in the coalescence of the two water bodies. A breach would accelerate marsh loss.

This near-term restoration feature involves the construction of shoreline protection measures, such as rock breakwaters, along the north bank of the MRGO and along important segments of the southern shoreline of Lake Borgne, as well as the investigation of various environmental restoration strategies requested in response to public concerns over the proposed plan to stabilize the MRGO navigation channel. The natural ridges along these selected shoreline segments are in danger of breaching in the very near future because of ship wakes along the channel and erosion from wind-driven waves along the lakeshore. Once these ridges are breached, the wetlands protected by these ridges become vulnerable to natural and man-made erosive forces that will quickly work to degrade the wetlands. Strategic placement of similar protective breakwaters has been effectively used along the MRGO in other locations to prevent bankline retreat and to protect large areas of estuarine wetlands from further erosion and degradation. The breakwaters may also facilitate future wetland creation using dedicated dredging and/or beneficial use of dredged material by serving as containment and protection for the restored wetlands. Additional ecosystem restoration features including marsh creation, freshwater introduction, barrier island restoration, and channel modification will be investigated to develop a suite of measures to stabilize and maintain important estuarine components.

The specific features proposed as part of the near-term MRGO environmental restoration plan include:

- Construct 23 miles of shoreline protection using rock breakwaters to prevent high rates of erosion that are occurring along the north bank of the MRGO.

- Construct 15 miles of rock breakwaters to protect critical points along the southern shoreline of Lake Borgne that are in peril of breaching in the near future.

These features would prevent the loss of 6,350 acres of marsh over the next 50 years. The estimated cost for designing and constructing critical rock breakwaters along the MRGO and selected sections of the southern Lake Borgne shoreline is $108.27 million (including monitoring). Details of this cost estimate are provided in the following tables:

Table MR 4-7 Summary of Costs for MRGO Environmental Restoration Features (June 2004 Price Level)

Lands and Damages	$	4,214,000
Elements:		
Bank Stabilization	$	80,000,000
Monitoring	$	842,000
First Cost	$	85,056,000
Feasibility-Level Decision Document	$	5,400,000
Preconstruction Engineering and Design (PED)	$	3,600,000
Engineering and Design (E&D)	$	4,614,000
Supervision and Administration (S&A)	$	9,600,000
Total Cost	**$**	**108,270,000**

Table MR 4-8 MRGO Environmental Restoration Features
FEDERAL AND NON-FEDERAL COST BREAKDOWN
(June 2004 Price Level)

Item	Federal	Non-Federal	Total
Decision Document (50%Fed-50%NFS)	$ 2,700,000	$ 2,700,000	$ 5,400,000
PED (65%Fed-35%NFS)	$ 2,340,000	$ 1,260,000	$ 3,600,000
LERR&D (100% NFS)	$ -	$ 4,214,000	$ 4,214,000
Ecosystem Restoration (65%Fed-35%NFS)	$ 54,739,100	$ 25,260,900	$ 80,000,000
Engineering and Design (E&D) (65%Fed-35%NFS)	$ 2,999,100	$ 1,614,900	$ 4,614,000
Supervision and Administration (S&A) (65%Fed-35%NFS)	$ 6,240,000	$ 3,360,000	$ 9,600,000
Monitoring (65%Fed-35%NFS)	$ 547,300	$ 294,700	$ 842,000
Total Construction	**$ 66,865,500**	**$ 36,004,500**	**$ 102,870,000**
TOTAL COST	**$ 69,565,500**	**$ 38,704,500**	**$ 108,270,000**
Cash Contribution	*$ 69,565,500*	*$ 31,790,500*	

In addition to these specific construction items, details of additional ecosystem restoration features would be developed during a study phase for purposes of estimating costs and benefits and for selecting the best set of projects to attain the ecosystem restoration goals for the area. This study effort would be conducted under the modification of the existing structures portion of the LCA proposed authorization. Under this approach, the MRGO channel is considered a structure for purposes of evaluating potential modifications to improve the environment.

Under this plan, large amounts of estuarine marshes would be protected from further shoreline erosion and other areas would be improved for the long-term benefit of the environment. In addition, other restoration features will be investigated that produce environmental benefits following the sequence established in the Coast 2050 plan to preserve wetlands and maintain the estuarine gradients established by the surrounding marshes. These habitats are significant for commercial and recreational fisheries as well as wildlife, and these areas serve as critical habitat for the threatened Gulf sturgeon.

The most important area of uncertainty associated with the near-term proposal is the future of the MRGO navigation channel as a deep draft-shipping route. A study is currently underway to reevaluate the economic benefits to the Nation of maintaining the channel. The scope of the reevaluation study covers a number of different alternative depth modifications and implementation timeframes for channel authorization changes. The outcome of that study has not been determined and, thus, the future status of the channel is unknown at this time. The

possibility exists that some time in the future the status of the channel could be changed through a USACE study recommendation and a Congressional action to deauthorize the shipping canal. However, while some of the ecosystem losses occurring in the area are directly associated with the operation of the navigation channel, the need for shoreline protection on Lake Borgne and the channel will remain regardless of the future status of the channel. The need will remain because the background factors in Louisiana wetland losses will continue and some shallow draft navigation will likely continue to use the area waterways.

4.2.3.2.2 *Small diversion at Hope Canal*

The cypress-tupelo swamps south of Lake Maurepas represent an accumulation of decades of plant production and associated ecological complexity. Much (arguably, relatively more than even most other coastal ecosystems in Louisiana) will be lost if this ecosystem is degraded beyond the ability to restore it. Given the temporal considerations associated with replacing long-lived tree species, preventing the loss of such trees is preferable from both economic and ecological standpoints.

The ongoing degradation of the Maurepas Swamp can be attributed to two types of factors: the first being the relatively constant stress associated with the lack of riverine input and prolonged inundation, and the second being the effects of stochastic events, most notably increased salinities. A qualitative estimate of the ecosystem losses that could be prevented by contingent authorization must consider both types of these factors.

The ongoing, constant deterioration of the Maurepas Swamp results in reduced tree productivity and health, increased tree mortality, decreased soil integrity, and increased relative subsidence. At this same time, stochastic events (particularly salinity increases) have the potential to dramatically increase tree mortality, while further stressing the remaining trees. Delaying project implementation would result in a continuation of the constant ecosystem decline, while also exposing the existing ecosystem to the additional risks associated with increased salinities and other difficult to predict events. Therefore, under any scenario, expediting implementation of the Hope Canal project would prevent a range of potential adverse effects. Again, because the higher end of this range would represent unpredictable events, it would not be possible to accurately predict the full possible extent of such losses.

The potential adverse effects discussed above would include decreased habitat for important avian species (most notably the bald eagle) and could also adversely affect the populations of a variety of indigenous species, such as crawfish, alligator snapping turtles, blue crab, and channel catfish. Additionally, such losses would also contribute to an overall decline in swamp health, as measured by soil integrity, substrate elevation, and vegetative health and resilience.

The effectiveness of the Hope Canal project depends in large part upon enhancing the health and productivity of the existing trees, which would play a major role in restoring soil integrity and counteracting subsidence. As discussed above, delaying action on the Hope Canal project would result in increased tree mortality and decreased health in the remaining trees. It is very difficult to quantify the number of individual trees that would die or become severely

stressed, but it is certain that the system as a whole will suffer without action. A delay would, therefore, most likely reduce the effectiveness of this restoration effort and/or require increased restoration inputs to achieve the same level of benefits.

Contingent authorization of the Hope Canal project is an appropriate and necessary way to meet the critical needs discussed above. Specifically, expediting the authorization process for this project has the potential to reduce tree mortality and decline in the overall health of the swamp; minimize exposure to stochastic risks, particularly increased salinities; reduce potential impacts to populations of indigenous fish and wildlife species; and minimize restoration costs and maintain restoration effectiveness.

The specific features proposed as part of the near-term Hope Canal Reintroduction plan include:

- Construct 2 10-foot x 10-foot box culverts in the Mississippi River levee with the invert set at an elevation to assure capability of essentially year-round water diversion.

- Build a receiving pond/settling basin with 100-foot x 100-foot dimensions, reinforced with 20 inches of riprap at the outfall of the culverts to slow velocities and remove heavy sand.

- Excavate a new leveed channel from the existing southern terminus of Hope Canal to the proposed reintroduction structure in the Mississippi River levee.

- Enlarge the cross section of Hope Canal to a width of 50 feet to accommodate the reintroduced river water. This channel would be a total of 27,500 feet long and run from the river to I-10.

- Implement outfall management measures to insure the water gets into the swamp.

- Install navigable constrictions in Hope Canal and gap an abandoned railroad embankment along Hope Canal north of I-10.

The Hope Canal project would restore approximately 36,000 acres of swamp. The estimated cost for designing and constructing the Hope Canal Reintroduction feature is $70.513 million (including monitoring). Details of this cost estimate are provided in the following tables:

Table MR 4-9 Summary of Costs for the Small Diversion at Hope Canal (June 2004 Price Level)

Lands and Damages	$	26,383,000
Elements:		
Relocations	$	22,384,000
Channels and Canals	$	4,125,000
Diversion Structures	$	6,520,000
Monitoring	$	594,000
First Cost	$	60,006,000
Feasibility-Level Decision Document	$	3,568,000
Preconstruction Engineering and Design (PED)	$	2,182,000
Engineering and Design (E&D)	$	1,189,000
Supervision and Administration (S&A)	$	3,568,000
Total Cost	**$**	**70,513,000**

Table MR 4-10 Small Diversion at Hope Canal FEDERAL AND NON-FEDERAL COST BREAKDOWN (June 2004 Price Level)

Item	Federal	Non-Federal	Total
Decision Document (50%Fed-50%NFS)	$ 1,784,000	$ 1,784,000	$ 3,568,000
PED (65%Fed-35%NFS)	$ 2,182,000	$ -	$ 2,182,000
LERR&D (100% NFS)*	$ -	$ 48,767,000	$ 48,767,000
Ecosystem Restoration (65%Fed-35%NFS)	$ 10,645,000	$ (25,336,250)	$ 10,645,000
Engineering and Design (E&D) (65%Fed-35%NFS)	$ 1,189,000	$ -	$ 1,189,000
Supervision and Administration (S&A) (65%Fed-35%NFS)	$ 3,568,000	$ -	$ 3,568,000
Monitoring (65%Fed-35%NFS)	$ 594,000	$ -	$ 594,000
Total Construction	**$ 18,178,000**	**$ 23,430,750**	**$ 66,945,000**
TOTAL COST	**$ 19,962,000**	**$ 25,214,750**	**$ 70,513,000**
Cash Contribution	*$ 47,082,250*	*$ (25,336,250)*	

*For the conditionally authorized feature, Small Diversion at Hope Canal, LERR&D exceeded 35% of the total project cost by $25,336,250, which is reimbursed to the non-federal sponsor.

To preserve swamps in the long-term, conditions must be reestablished that both allow survival of existing cypress and tupelo trees and allow at least periodic reproduction and recruitment of seedlings. In the Maurepas Swamp, non-stagnant water, accretion, and freshening are all needed to achieve these goals. From the perspective of sustainable ecosystem management, it is believed that implementation of a reintroduction project of appropriate size into the Maurepas Swamp is essential for bringing the area back toward environmental sustainability. Implementation of the proposed reintroduction would greatly increase flow through the project area, which would provide constant renewal of oxygen- and nutrient-rich waters to the swamps. (It is important to note that the proposed alternative would be operated such that reintroductions are reduced or stopped when climate and soil conditions are conducive to tree regeneration).

Benefits of the Hope Canal project would include measurable increases in productivity, which would help build swamp substrate and balance subsidence, as well as increases in growth of trees, reduced mortality, and an increase in soil bulk density. As accretion improves, there also is expected to be an increase in recruitment of new cypress and tupelo trees, required for long-term sustainability of the swamp. Anticipated sediment benefits to the swamp include direct contribution to accretion, as well as contribution to biological productivity through the introduction of sediment-associated nutrients, which also contributes to production of substrate. The sediment loading to the target swamps from the Hope Canal reintroduction is conservatively estimated to be >1,000 $g/m^2/yr$, or about twice the estimated quantity needed to keep up with subsidence.

The Hope Canal project has already been the subject of interagency review, numerous planning processes, considerable public review, and a range of environmental and engineering analyses. This review process has helped identify and address a number of potential questions/concerns, such as whether river reintroduction could cause flooding. While more information and evaluation will be needed to fully answer such questions, the information available to date indicates that such issues will either not occur or, if they could occur, are manageable and do not render the project infeasible or too risky. With respect to flooding in particular, the increased channel capacity in Hope Canal should provide greater ability to remove storm water from the existing drainage system, and the operation plan for the reintroduction project would be developed to accommodate such a use.

The Hope Canal project would offer an excellent opportunity to capitalize on existing environmental and engineering information to provide near-term environmental benefits to an area of critical need. Accordingly, it should be included in the contingent authorization category for the LCA Study.

4.2.3.2.3 *Barataria Basin barrier shoreline restoration*

The Louisiana barrier islands and shorelines are almost entirely uninhabited but are an essential ecosystem to the Louisiana coastal area since they include wetland habitats, essential fish habitat, and have high fish and wildlife value. The Louisiana barrier islands also protect interior coastal wetlands, which also have high fish and wildlife value within the Louisiana coast area.

The accelerated loss of Louisiana's coastal wetlands has been ongoing since at least the early 1900s with commensurate deleterious effects on the ecosystem and possible future negative impacts to the economy of the region and the Nation (USACE 2004 – Main Report). Contributing to these deleterious effects is the collapse of the Louisiana barrier islands and gulf coast shorelines. This Louisiana coastal area restoration feature is to restore or re-build the natural ecological function of the two coastal barrier shorelines, known as the Caminada Headland and Shell Island reaches.

The average rate of long-term (greater than 100 years) shoreline change along the Louisiana coast is a retreat of 19.9 ft/yr. The average short-term (less than 30 years) rate of shoreline change is a retreat of 30.9 ft/yr (USACE 2004 – Appendix D.3). Of the 505 miles of Louisiana gulf shoreline, 484 miles (96 percent) are eroding. The Barataria Basin Barrier Shoreline Restoration Project is one of three barrier island projects in the LCA Plan. All three of these barrier island projects are important; however, the Barataria Barrier Shoreline Restoration is considered critical due to the greatly degraded state of this shoreline and its key role in protecting and preserving larger inland wetland areas and bays. If this fragile area is not addressed quickly, restoration would be far more difficult and costly.

The Barataria Basin Barrier Island Restoration feature addresses critical ecological needs and would sustain essential geomorphic features for the protection of Louisiana's coastal wetlands and coastal infrastructure. The project is synergistic with future restoration by maintaining or restoring the integrity of Louisiana's coastline, upon which all future coastal restoration is dependent. The design and operation of the feature would maintain the opportunity for and support the development of large-scale, long-range comprehensive coastal restoration. The feature would also support the opportunity for resolution of scientific and technical uncertainties through incorporation of demonstration features and/or adaptive management.

The specific features proposed as part of the near-term Barataria Basin Barrier Island Restoration plan include:

Caminada Headland

- Dredge and place 9 to 10 million cubic yards of sand from Ship Shoal along 13 miles of shoreline to create a dune approximately 6 feet high and a 1,000-foot-wide shoreward berm. Plant the dune with native varieties of bitter panicum and sea oats for stabilization.
- Remove thirteen existing breakwaters that are failing.
- Approximately 2 million cubic yards of sand would be placed about every 10 years to periodically restore the dune and berm.
- Dredge and place about 6 million cubic yards of material to create a marsh area about 5 miles long and up to 1,200 feet wide. The created marsh would be planted with native vegetation, such as smooth cordgrass.
- Nourish existing eroding marsh in the area with a thin layer of dredged material.

Shell Island (west)

- Dredge and place 3.4 million cubic yards of material to create 139 acres of dune and berm and 74 acres of marsh.
- Plant the dune with native varieties of bitter panicum and sea oats for stabilization.
- Plant the marsh with smooth cordgrass, also a native variety.

Shell Island (east)

- Dredge and place 6.6 million cubic yards of material to create 223 acres of dune and berm and 191 acres of marsh. Contain material with geotubes on the gulf side and earthen dike on the bay side.
- Plant the dune with native varieties of bitter panicum and sea oats for stabilization.
- Plant the marsh with smooth cordgrass, also a native variety.

The Caminada Headland component would preserve 640 acres of dune and berm over the next 50 years and 1,780 acres of saline marsh. The Shell Island component would preserve 147 acres of barrier island habitat over the next 50 years. The estimated cost for designing and constructing these barrier shoreline restoration features is $247.204 million (including monitoring). Details of this cost estimate are provided in the following tables:

Table MR 4-11 Summary of Costs for Barataria Basin Barrier Shoreline Restoration (June 2004 Price Level)

Lands and Damages	$	15,558,000
Elements:		
Beach Replenishment	$	181,000,000
Monitoring	$	1,966,000
First Cost	$	198,524,000
Feasibility-Level Decision Document	$	10,200,000
Preconstruction Engineering and Design (PED)	$	6,800,000
Engineering and Design (E&D)	$	9,960,000
Supervision and Administration (S&A)	$	21,720,000
Total Cost	**$**	**247,204,000**

Table MR 4-12 Barataria Basin Barrier Shoreline Restoration
FEDERAL AND NON-FEDERAL COST BREAKDOWN
(June 2004 Price Level)

Item	Federal	Non-Federal	Total
Decision Document (50%Fed-50%NFS)	$ 5,100,000	$ 5,100,000	$ 10,200,000
PED (65%Fed-35%NFS)	$ 4,420,000	$ 2,380,000	$ 6,800,000
LERR&D (100% NFS)	$ -	$ 15,558,000	$ 15,558,000
Ecosystem Restoration (65%Fed-35%NFS)	$ 127,762,700	$ 53,237,300	$ 181,000,000
Engineering and Design (E&D) (65%Fed-35%NFS)	$ 6,474,000	$ 3,486,000	$ 9,960,000
Supervision and Administration (S&A) (65%Fed-35%NFS)	$ 14,118,000	$ 7,602,000	$ 21,720,000
Monitoring (65%Fed-35%NFS)	$ 1,277,900	$ 688,100	$ 1,966,000
Total Construction	**$ 154,052,600**	**$ 82,951,400**	**$ 237,004,000**
TOTAL COST	**$ 159,152,600**	**$ 88,051,400**	**$ 247,204,000**
Cash Contribution	*$ 159,152,600*	*$ 67,393,400*	

The Caminada Headland component of the Barataria Basin Barrier Shoreline Restoration should be constructed at the earliest possible date and include ecosystem restoration of the dune and berm as well as marsh creation. The overall goal of this feature is to maintain this headland reach, which would sustain significant and unique coastal habitats, help preserve endangered and threatened species, continue to transport sand to Grand Isle, and protect Port Fourchon and the only hurricane evacuation route available to the region.

The Shell Island component of the Barataria Basin Barrier Shoreline Restoration should be constructed at the earliest possible date and include beach restoration by use of containment to rebuild a vital link in the Louisiana barrier shoreline system. The overall goal is to prevent the intrusion of the Gulf of Mexico into the interior bays and marshes, which threatens fisheries and the regional ecology. The project would also help restore natural sand transport along this reach of the coast supporting the adjacent regional shorelines and various shoreline habitats. Numerous infrastructure elements such as highways, levees, ports, and oil and gas facilities located along the rim of the inland bays would incidentally benefit from this ecologic restoration.

The coastal resources at risk for the Barataria Basin Barrier Shoreline Restoration feature and the level of investigation in this area undertaken to date provides a high level of certainty in the appropriateness of the restoration feature and the range of alternative configurations that should be addressed in a final decision document. This project must be undertaken with a strong adaptive management approach due to the uncertainties of coastal processes and response to restoration. Monitoring- based project management would largely offset technical uncertainties. The current status of analyses and NEPA documentation also provides a high degree of

confidence that the design and documentation for this restoration feature can be completed for approval and implementation on an expedited schedule.

4.2.3.2.4 *Small Bayou Lafourche reintroduction*

Bayou Lafourche occupies a central location in Louisiana's Deltaic Plain, between Terrebonne and Barataria Bays. This valuable estuarine complex is also Louisiana's most endangered, due in large part to the disruption of natural deltaic processes. Once a major distributary of the Mississippi River, Bayou Lafourche was a critical conduit for freshwater, nutrients, and sediment, which helped build and nourish marshes in the Barataria-Terrebonne estuary complex. Although flows down Bayou Lafourche declined as the river switched its course 800 to 1,000 years ago, the bayou continued to provide important riverine inputs until it was dammed in 1904 to alleviate flooding problems. While a limited amount of river flow (currently around 200 cfs) was subsequently restored to the bayou, there is an opportunity to use this natural distributary to increase freshwater, nutrient, and sediment inputs to coastal areas with critical restoration needs.

Approximately 2,000 years ago, the course of the Mississippi River began to occupy what is now Bayou Lafourche. This channel remained a primary distributary of the Mississippi River until about 800 to 1,000 years ago, when it was gradually replaced by the modern course of the river. While it was active, the Bayou Lafourche distributary built a large natural levee, with elevation ranging from over 20 feet NGVD near Donaldsonville, to approximately 1 foot near the mouth of the bayou.

In 1851 and 1858, discharge in Bayou Lafourche was measured at 6,000 to 11,000 cfs during high river stages. Thus, despite the shift in the river, Bayou Lafourche remained a major conduit by which freshwater, nutrients, and sediment were transported to coastal wetlands. During this time, the bayou was also extensively used for navigation.

Flows continued to decrease during the 19th century and, by 1887, a bar had developed at the head of the bayou, which restricted flow and navigation. This led to annual dredging by the USACE. Additionally, the natural levee along the bayou was not sufficient to protect settled areas from flooding, and plantation owners gradually built up levees along most of the length of the bayou. Despite these levees, flood problems along Bayou Lafourche began to overshadow the usefulness of the channel for navigation. In 1902, Federal approval was given to construct a temporary dam across the head of the bayou. The dam was completed in 1904. The intent was to replace this dam with a lock, to allow for navigation. However, the dam was subsequently replaced by the Mississippi River flood control levee.

In 1906, a new problem arose: salt-water intrusion was recorded at Bush Grove Plantation just south of Lafourche Crossing. Agricultural, industrial, and domestic users recognized that fresh water would be necessary for their communities to continue to thrive. Also, damming the bayou contributed to dramatic salinity increases in the Barataria-Terrebonne estuary system. Anecdotal information gives evidence of the dramatic changes that resulted from the increased salinities. By 1910, for example, oysters were found growing in areas around

Leeville, and where orange orchards and rice fields had once flourished, saltwater seeped into the land, killing the oak groves and making the soil unsuitable for farming.

Responding to expanding industrial and residential demands, the Louisiana Legislature created the Bayou Lafourche Freshwater District in the 1950s. In 1955, a pump/siphon system with a capacity to reintroduce approximately 340 cfs was installed on the levee at Donaldsonville. No Federal funds were spent on that project. Because of channel constraints, this existing pump/siphon currently provides approximately 200 cfs of river water into the bayou. Approximately 80 percent of the current volume of water reintroduced to the bayou flows through the system, with approximately 20 percent being used for water supply (of which a relatively small amount is used for irrigation).

Today the bayou supplies fresh water to over 300,000 residents in four parishes: Ascension, Assumption, Lafourche and Terrebonne. In addition to residents and land-based businesses, Bayou Lafourche also provides potable water through Port Fourchon to offshore oil and gas facilities in the Gulf of Mexico. The bayou also provides aesthetic, recreation, drainage and navigation benefits to the numerous communities that have developed along its banks.

From 2000 to 2050, this estuary complex is predicted to lose approximately 231,000 acres of wetlands. This is 50 percent of the predicted loss in the entire state. In addition, approximately 465,000 acres have been lost in this complex over the past 50 years. The continued loss will further weaken an already stressed ecosystem that supports a wide range of resident and migratory animals. The highly diverse and numerous fish and shellfish populations in the complex would dramatically decline as land loss continues. In the future, there would be decreased habitat for neo-tropical migratory birds, furbearers, waterfowl, and threatened species such as the bald eagle.

Proposals to reconnect Bayou Lafourche as a restoration feature date back to at least 1992. At that time, coastal researchers from Louisiana State University's Center for Coastal Energy and Environmental Resources (CCEER; Currently LSU School of the Coast and the Environment) crafted a report that included reconnection of the former distributary as an innovative alternative to help address the land loss crisis in the Louisiana coastal zone. In the November 1993 Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) Main Report and Environmental Impact Statement (EIS) submitted to the U.S. Congress by the Task Force, reintroduction of Mississippi River water via Bayou Lafourche was listed as a major strategy for both the Terrebonne and Barataria basins.

The specific features proposed as part of the near-term Bayou Lafourche Reintroduction plan include:

- Upgrading existing pump/siphon facility to operate at the full 340 cfs capacity and constructing a 660 cfs new pump/siphon facility.

- Improving channel capacity to 1,000 cfs by eliminating the existing fixed weir at Thibodeaux, dredging of 6.7 million cubic yards of material over about 55 miles of the channel within its existing banks. If the dredged sediments are clean, they will be made

available for local use and land application or sale. Any contaminated sediment will require special placement.

- Providing bank stability over three miles of the channel. The improved channel and bank stabilization would prevent flooding of bayou-side residents.

- Operating five monitoring stations to provide continuous information on water levels and other bayou conditions.

- Installing two adjustable weirs, one at Thibodeaux and another at Donaldsonville, to control water levels as necessary to eliminate current causes of bank instability, and to facilitate passage of storm runoff.

- Constructing a sediment trap at Donaldsonville to control siltation of the main channel and insure that flows are not impeded. This trap would be cleaned as needed.

As part of the CWPPRA process, the wetland benefits of the Bayou Lafourche project, with regard to providing habitat for a variety of fish and wildlife species, were calculated using Wetland Value Assessment (WVA) methodology. The benefit areas encompass 85,094 acres (nearly 49,000 acres of wetlands and 36,000 acres of water). Wetland benefits were determined primarily in terms of the projected reduction in marsh loss expected to occur as a result of the project. The mechanisms through which the diversion was expected to impact marsh loss in the seven areas were: (1) the reduction of salinity stress due to increased freshwater flows, and (2) the stimulation of organic production in emergent marshes as a result of the introduction of clay sediment and nutrients. Based on the 1998 WVA, it is estimated that at the end of 50 years there would be approximately 2,500 more acres of marsh than if the project had not been built. The WVA also credited this project with increasing submerged aquatic vegetation (SAV) that improves habitat for fish and waterfowl.

The estimated cost for designing and constructing the Bayou Lafourche Reintroduction is $144.116 million (including monitoring). Details of this cost estimate are provided in the following tables:

Table MR 4-13 Summary of Costs for Small Bayou Lafourche Reintroduction (June 2004 Price Level)

Lands and Damages	$	12,590,000
Elements:		
Relocations	$	14,720,000
Channels and Canals	$	52,156,000
Pumping Plants	$	16,230,000
Bank Stabilization	$	6,894,000
Monitoring	$	1,026,000
First Cost	$	103,616,000
Feasibility-Level Decision Document	$	13,500,000
Preconstruction Engineering and Design (PED)	$	9,000,000
Engineering and Design (E&D)	$	5,040,000
Supervision and Administration (S&A)	$	12,960,000
Total Cost	**$**	**144,116,000**

Table MR 4-14 Small Bayou Lafourche reintroduction
FEDERAL AND NON-FEDERAL COST BREAKDOWN
(June 2004 Price Level)

Item	Federal	Non-Federal	Total
Decision Document (50%Fed-50%NFS)	$ 6,750,000	$ 6,750,000	$ 13,500,000
PED (65%Fed-35%NFS)	$ 5,850,000	$ 3,150,000	$ 9,000,000
LERR&D (100% NFS)	$ -	$ 27,310,000	$ 27,310,000
Ecosystem Restoration (65%Fed-35%NFS)	$ 66,683,500	$ 8,596,500	$ 75,280,000
Engineering and Design (E&D) (65%Fed-35%NFS)	$ 3,276,000	$ 1,764,000	$ 5,040,000
Supervision and Administration (S&A) (65%Fed-35%NFS)	$ 8,424,000	$ 4,536,000	$ 12,960,000
Monitoring (65%Fed-35%NFS)	$ 666,900	$ 359,100	$ 1,026,000
Total Construction	**$ 84,900,400**	**$ 45,715,600**	**$ 130,616,000**
TOTAL COST	**$ 91,650,400**	**$ 52,465,600**	**$ 144,116,000**
Cash Contribution	*$ 91,650,400*	*$ 18,405,600*	

The wetlands being lost in the Barataria-Terrebonne estuary complex are of vast ecological importance. It has been estimated that nearly one fifth of the Nation's estuarine-dependent fisheries rely on the diverse habitats of Barataria-Terrebonne. Annual commercial fisheries landings have been estimated at more than $220 million, including oysters, shrimp, crabs, and various finfish. The wetlands and other habitats of the Barataria-Terrebonne estuary complex are also important for a wide range of resident and migratory birds. It is estimated that 353 species of birds are known to have occurred in Barataria-Terrebonne, of which 185 species are annual returning migrants. In total, approximately 735 species of birds, finfish, shellfish, reptiles, amphibians, and mammals spend all or part of their life cycle in the estuary.

By increasing the connection of the river to the bayou, the Bayou Lafourche project would nourish marshes, contribute to soil building through mineral sediment accretion and organic matter production, and combat saltwater intrusion during droughts or prolonged southerly winds. The associated increased vegetative health and vertical accumulation of the marsh surface would counterbalance subsidence and reduce future wetland loss in the area.

Although the WVA many attributes of estuaries that fish and wildlife rely upon, there would be unquantifiable benefits over the 49,000 acres of wetlands and 36,000 acres of estuarine

waters, especially with a project such as this that is synergistic with other projects. It is possible that the acres preserved are underestimated. There would be benefits to threatened species such as the bald eagle and higher quality Essential Fish Habitat would be preserved. Waterfowl habitat would be improved.

Having undergone years of interagency and public review, the Bayou Lafourche project is well suited for conditional authorization within the LCA Plan. Since being selected by the CWPPRA Task Force in 1996, the Bayou Lafourche project has undergone considerable environmental and engineering review, including hydraulic modeling and environmental benefits assessment. Most recently, engineering and design and the National Environmental Policy Act process have been initiated as part of the ongoing CWPPRA process. The existing information provides greater certainty with respect to costs and environmental outcomes, and will help expedite completion of both the feasibility study and EIS.

4.2.3.2.5 *Medium diversion with dedicated dredging at Myrtle Grove*

Approximately 1,000 years ago, the Plaquemines Delta began to deposit sediment in the Myrtle Grove study area. Shallow water areas were filled with interdistributary and marsh deposits. The Mississippi River has been in its present location for the past 1,000 years, and the study area continued to receive fresh water and sediment from the Mississippi River and its distributaries.

With the development of the Mississippi River levee system over the last century, once frequent introductions of sediment and nutrients were disrupted. These introductions helped the area accrete sediment and detritus, and the marshes kept pace with subsidence. Another major factor was the dredging of oil and gas and navigation canals that allowed salt water to encroach far inland, resulting in a shift from intermediate marshes to slower-growing brackish marshes. The high subsidence rate combined with these factors resulted in a rapid degradation of the marshes in the area.

The project area is currently a sediment-starved system with little freshwater input. These factors have magnified the high subsidence in the area, resulting in massive land loss. To counteract this loss, the project area needs inputs of both sediment and water. The Davis Pond diversion provides freshwater input into the basin to the north, but local marshes are too far removed from the diversion structure to benefit directly from the introduction of nutrients, and the salinity regime would be more controllable with a freshwater input closer to the area of need.

The Medium Diversion with Dedicated Dredging at Myrtle Grove critical near-term feature addresses both the need to preserve long-term restoration opportunities and to bring significant reversal of the wetland loss trend. In preserving long-range restoration opportunities, implementation of this feature also supports several possible outcomes of proposed large-scale studies. The immediate restoration impact of the implementation of the Myrtle Grove feature is significant in addressing predicted future wetland loss in an ecologically critical zone of habitat transition in one of the most productive estuaries in the Nation. In addition, commercial and private development at the perimeter of this basin, located to take advantage of its productivity and to support local, regional, and National economic interests, would receive benefits from the

restoration of these wetlands. These benefits would include continued sustainable biologic productivity in the estuary as well as the indirect benefit of reduction of storm-driven tidal stages.

The key components of the proposed feature include:

- A gated diversion structure with a capacity of approximately 5,000 cfs
- Inflow and outflow channels totaling approximately 16,000 feet
- Associated channel guide levees and infrastructure relocation
- Creating at least 6,500 acres of new marsh through dedicated dredging

This project is predicted to create/preserve 6,563 acres over the next 50 years. The estimated cost for designing and constructing the Myrtle Grove Diversion and Dedicated Dredging feature is $293.962 million (including monitoring). Details of this cost estimate are provided in the following tables:

Table MR 4-15 Summary of Costs for the Medium Diversion with Dedicated Dredging at Myrtle Grove (June 2004 Price Level)

Lands and Damages	$	78,990,000
Elements:		
Relocations	$	3,780,000
Ecosystem Restoration	$	96,970,000
Channels and Canals	$	24,150,000
Diversion Structures	$	21,800,000
First Cost	$	225,690,000
Feasibility-Level Decision Document	$	22,005,000
Preconstruction Engineering and Design (PED)	$	14,670,000
Engineering and Design (E&D)	$	8,215,000
Supervision and Administration (S&A)	$	21,125,000
Monitoring	$	2,257,000
Total Cost	**$**	**293,962,000**

Table MR 4-16 Medium Diversion with Dedicated Dredging at Myrtle Grove
FEDERAL AND NON-FEDERAL COST BREAKDOWN
(June 2004 Price Level)

Item	Federal	Non-Federal	Total
Decision Document (50%Fed-50%NFS)	$ 11,002,500	$ 11,002,500	$ 22,005,000
PED (65%Fed-35%NFS)	$ 9,535,500	$ 5,134,500	$ 14,670,000
LERR&D (100% NFS)	$ -	$ 82,770,000	$ 82,770,000
Ecosystem Restoration (65%Fed-35%NFS)	$ 142,920,000	$ -	$ 142,920,000
Engineering and Design (E&D) (65%Fed-35%NFS)	$ 6,339,750	$ 1,875,250	$ 8,215,000
Supervision and Administration (S&A) (65%Fed-35%NFS)	$ 16,509,750	$ 4,615,250	$ 21,125,000
Monitoring (65%Fed-35%NFS)	$ 1,467,050	$ 789,950	$ 2,257,000
Total Construction	**$ 176,772,050**	**$ 95,184,950**	**$ 271,957,000**
TOTAL COST	**$ 187,774,550**	**$ 106,187,450**	**$ 293,962,000**
Cash Contribution	*$ 187,774,550*	*$ 12,414,950*	

Currently authorized Federal environmental projects (in this specific case, the Davis Pond Freshwater Diversion project) have been designed to sustain and stabilize the present basin wide salinity regime. This outcome falls short of the broader restoration objectives, but existing projects can and will be incorporated or modified in the implementation of this and other future restoration efforts. In this manner, the proposed restoration feature would also support adaptive management and learning goals and provide a platform for additional learning through add-on demonstration projects.

The proposed restoration feature considers a diversion ranging from 2,500 to 15,000 cfs coupled with dedicated dredging for the creation of up to 19,700 acres of new wetlands. This combination would allow for rapid creation of wetland acreage and long-term sustainability. The diversion will allow the reintroduction of freshwater, sediment, and nutrients into the critically effected area of the basin in a manner similar to the rise and fall of the river's hydrologic cycle. The rate of reintroduction would be optimized according to the overall planning objectives of the LCA restoration effort to maintain hydro-geomorphic diversity and connectivity, as well as habitat diversity. The dedicated dredging component of the Myrtle Grove feature would allow immediate recovery of former wetland areas already converted to open water. The combination is also expected to maximize the amount of acreage created per yard of sediment placed by capitalizing on incremental accretion of diverted sediment.

A diversion from the Mississippi River would provide both resources, and would provide a relatively cost-effective way to recreate land in the project area. Nevertheless, the land accretion process is slow, and an introduction of material through dedicated dredging would provide for a marsh platform immediately. To balance the need for wetland acreage in the near-term with the ability to sustain the marshes over the long-term, various combinations of marsh creation through dedicated dredging and freshwater introductions through a river diversion would be examined.

The proposed restoration feature has the potential to prevent significant future land loss where currently predicted to occur in the central portion of the Barataria Basin. Ecologic modeling indicates that, in the next 50 years, all saline and brackish marsh and approximately 40 percent of the intermediate marsh in the Barataria Basin will be lost. This can be attributed to lack of sediment input, and continued soil subsidence. In addition to directly resulting in wetland loss, these factors are compounded by the low success of saline vegetation reestablishing on the highly organic soils established in fresh marshes. These combined factors, along with the projected hydraulic and ecologic trends in, and current make up of the area in the vicinity of Myrtle Grove, indicates that it is at particularly high risk.

The restoration of wetlands in this area would also protect and support socio-economic interests located in the central and upper portions of the Barataria Basin to capitalize on the fisheries productivity of the estuary. The communities of Lafitte and Barataria represent the southernmost development in the interior of the Barataria Basin and are located outside of any existing hurricane protection works. Loss of the existing wetland structure would have an immediate impact on the sustainability of these communities. In addition, industries located along the Mississippi River in the vicinity of Myrtle Grove would also become threatened with the loss of interior wetlands in this area. Currently, there is no Federal hurricane protection levee parallel to the river in this area. The absence of this protection is due, in part, to the historic presence of the wetlands.

The Medium Diversion with Dedicated Dredging at Myrtle Grove restoration feature addresses critical ecological needs in a sensitive area of the most highly productive estuarine systems in the Nation. The components of the feature create a synergy that would result in highly productive and sustainable outputs. The design and operation of the feature would maintain the opportunity for and support the development of large-scale, long-range comprehensive coastal restoration. The feature would also support opportunity for resolution of scientific and technical uncertainties through incorporation of demonstration projects and/or adaptive management.

4.2.3.3 Future Congressional Authorization for implementation of critical restoration features

The near term critical restoration features within the LCA Plan that are not conditionally authorized would be submitted to Congress for consideration of authorization in future WRDAs. Based on an analysis of the current LCA Plan schedule, components would have feasibility-level decision documents or Feasibility Reports completed and ready to submit to Congress through FY 2013, with construction starting no later than FY 2014.

4.2.4 Large-Scale and Long-Term Concepts Requiring Detailed Study

During plan formulation, the PDT identified several candidate large-scale and long-term concepts for potential incorporation into the LCA Plan. These restoration concepts exhibited a greater potential to contribute to achieving restoration objectives in 1) the subprovince within which they would be located, 2) adjacent subprovince(s), and/or 3) substantial portions of Louisiana's coastal ecosystem. Accordingly, the corresponding benefits and costs for these potential plan features should be further analyzed and confirmed to determine how best to incorporate them, if at all, with other plan features. Upon completion of detailed feasibility studies, recommendations for action would be documented in the manner specified for features that would be proposed for Congressional authorization, and would be subject to the standard review and authorization process for USACE water resources projects. Short descriptions of the large-scale, long-term concepts are included below.

4.2.4.1 Acadiana Bays Estuarine Restoration Study

The primary goal of this study is to evaluate the potential for reestablishing historic water quality conditions and viable estuarine fisheries in the Acadiana Bays system while maintaining a growing delta system in Atchafalaya Bay. The Acadiana Bays area of Louisiana consists of those bays in the central part of coastal Louisiana including from east to west, Four League, Atchafalaya, East Cote Blanche, West Cote Blanche, Weeks, and Vermilion Bays (**figure MR 4-3**).

During the last half of the 20th century, this estuary has experienced a freshening trend and increased turbidity. As a result, submerged aquatic vegetation densities and the viability of estuarine fisheries have declined. Several factors have led to these problems. In 1900, the Atchafalaya Basin received about 5 percent of the total of the Red River and Mississippi Rivers. By the 1950s, the Atchafalaya share had grown to 30 percent and has remained at that distribution with the construction of the Old River Control Structures in the early 1960s. Even though the flow distribution down the Atchafalaya has been stabilized, the basin has experienced significant changes in the twentieth century, resulting in greater efficiency to convey water and sediment to the estuary. Also, at one time, the bay complex reportedly contained the largest concentration of oyster reefs in the United States. The remnant reefs had limited wave action and storm impacts in the Acadiana Bays by providing a physical barrier to exchange; however these were largely destroyed by shell dredging prior to the mid-1980s. Removing this reef complex eliminated natural baffles between the Gulf of Mexico and Atchafalaya Bay, as well as Atchafalaya and West Cote Blanche Bays.

Figure MR 4-3: The Acadiana Bays, Louisiana.

The State of Louisiana has conducted initial engineering studies for restoration of the Acadiana Bays estuary. The large-scale study would expand on this effort by improving existing hydrodynamic models, using existing and new data to evaluate the salinity and turbidity levels in the Acadiana Bays system and ultimately determining the best course of action for restoration and maintenance of this estuarine system.

Several potential alternatives that have been proposed including construction of a rock jetty or a series of staggered reefs from Pt. Chevreuil to Marsh Island to impede the western flow of fresh water and sediment from Atchafalaya Bay, and shoreline stabilization and/or gap closures on the GIWW and the eastern shoreline of Freshwater Bayou Canal to minimize freshwater flow into the Acadiana Bays system.

The Acadiana Bays Estuarine Restoration Study would ultimately aid in defining the restoration plans of this ecologically important region of coastal Louisiana. This study has an anticipated start date of FY06 and an anticipated finish date of FY09, with an approximate cost of $7,110,000.

4.2.4.2 Upper Atchafalaya Basin Study

The study purpose is to conduct a system-wide comprehensive analysis of the problems and opportunities related to flood control, navigation, and ecosystem sustainability for the lower Red River, Old River, Mississippi River, and Atchafalaya River Basins.

This study relates primarily to the Mississippi River and Tributaries Project and, as such, would be funded under that project. It is discussed in this report because it would link closely with the Mississippi River Hydrodynamic Study (via the modeling to be developed) and because several proposed LCA features would either impact the operation of the ORCS and/or effect changes to the Atchafalaya Basin, the Mississippi River, and the coastal zone. As such, any potential LCA alternatives would have to assess the potential impacts to the existing river systems.

The primary objectives of the study are to:

1. Determine whether improvements are necessary to sustain the MR&T project's ability to pass project flow, maintain an efficient and safe navigation system, and maintain channel and bank stability.

2. Investigate the degradation of the Atchafalaya Basin and its ecosystem and develop solutions to stabilize and restore the system.

3. Investigate the sediment distribution needs and capabilities of the ORCS and determine the optimum distribution that is required to ensure adequate flood control, safe navigation, and ecosystem sustainability.

The secondary objectives of the study are to:

1. Investigate means to improve water quality and circulation in degraded areas of the Atchafalaya Basin that are not covered by the Water Management Units.

2. Investigate the ability of the system to transport sediment and freshwater to the Louisiana coastal area for delta building and marsh restoration purposes.

3. Investigate the potential of the system to further contribute to coastal ecosystem restoration.

This large-scale study would examine modifications to the ORCS operation to alter water circulation in the Atchafalaya Basin back swamps and associated lakes and bayous. Altering water circulation may achieve greater transport of sediment to coastal wetlands and reduced nutrient delivery to the Gulf of Mexico. Other potential benefits include enhanced water quality and aquatic ecosystem health in the upper Atchafalaya Basin Floodway. Adjustments to the operation of the ORCS may include daily and seasonal deviations from the 70/30-flow distribution while maintaining the flow distribution on an annual basis. Channel modifications within the upper basin would also be examined.

Increased sediment availability to coastal wetlands may act synergistically with other efforts to maximize the beneficial influence of these vital river resources through other elements of the near term LCA Plan. This includes the enhancement of Atchafalaya River/GIWW freshwater inflows into the central and eastern Terrebonne Basin, the operation of the Houma Navigation Canal Lock, and other water control features within the proposed Morganza to the Gulf Hurricane Protection Project for restoration purposes. The Atchafalaya River Diversion Study is expected to begin in FY04 and end in FY07.

4.2.4.3 Chenier Plain Freshwater and Sediment Management and Allocation Reassessment Study

The purpose of this study is to further develop a comprehensive management plan to restore the Chenier Plain's large-scale system hydrology and maximize the influence of the available sediment and fresh water. More efficient management of the existing limited water and sediment resources would stabilize and restore the wetlands of the region.

This study area is comprised of the Louisiana Chenier Plain, which extends from the western bank of Freshwater Bayou westward to the Louisiana-Texas border in Sabine Lake, and from the marsh areas just north of the Gulf Intracoastal Waterway (GIWW) south to the Gulf of Mexico in Vermilion, Cameron, and Calcasieu parishes. Although this system is linked to the Mississippi River Delta, the processes which governed its creation and subsequent degradation are different from those that affect the Deltaic Plain. The Chenier Plain wetland ecosystem developed primarily as a result of the interplay of three coastal plain rivers (Sabine, Calcasieu, and Mermentau Rivers), the intermittent mudstream from the Mississippi River outlets, and the Gulf of Mexico. During periods of active delta building in the western Mississippi Deltaic Plain, gulf currents transport fine-grained sediment west in a mudstream towards the Chenier Plain and form expansive mudflats. As Mississippi River Delta building switched to the east, this influence is removed and gulf processes rework the mudflats into beach ridges (cheniers). Subsequent westward shifts of the Mississippi River strand these cheniers inland, giving the Chenier Plain its defining characteristic.

Public works projects and other man-made and natural factors have altered the hydrology of the Louisiana Chenier Plain. In some areas, the estuarine character has been completely lost. In others, enhanced marine and tidal influences to sensitive areas have contributed to marsh degradation. Previous study efforts have indicated the technology currently applied to address the problems of the Louisiana Chenier Plain may be ineffective and insufficient to restore this region's landscape. A greater understanding of the availability of freshwater and sediment is necessary to plan appropriate ecosystem actions in the area.

Building on existing and ongoing modeling efforts, this study would help facilitate the development of a comprehensive restoration plan for the Chenier Plain ecosystem. Potential features to be analyzed may also include modification of existing authorized navigation and flood control projects, dedicated or beneficial use of dredged material, shoreline protection, modifications of land-use practices, and restoration of tidal influence to appropriate areas. The study is scheduled to begin in FY04 and conclude in FY07 at an estimated cost of $12 million.

4.2.4.4 Mississippi River Delta Management Study

The purpose of this study is to identify and evaluate features that would greatly increase the deposition of Mississippi River sediment in shallow coastal areas and restore deltaic growth in the Mississippi River Delta Plain. The study area is the Mississippi River Delta below Pointe a la Hache.

Every year, the Mississippi River transports millions of cubic yards of sediment to the delta at the mouth of the river. The District dredges approximately 31 mcy (2.4 million cubic meters) of sediment (sand) in the lower Mississippi. The river also transports a suspended sediment load (mostly silts) to the mouth of about 70 mcy (5.4 million cubic meters). Most of this material, as well as some of the sand load, is transported to deep waters of the Gulf of Mexico. However, little of this material is captured by the surrounding wetlands around the Mississippi River Delta. In addition, excess nutrients are diverted offshore instead of filtering through wetlands for assimilation, which leads to the annual development of a significant hypoxic zone in the northern Gulf of Mexico. The lack of sediment and nutrient input into the surrounding marshes has reduced regional soil building rates to a point where they are insufficient to offset effects of relative sea level change (RSLC), and massive land loss has resulted.

The District completed a Mississippi River Delta Reconnaissance Study in 1990 that indicated significant potential land building could be achieved by implementing diversion and channel projects, but environmental and economic analyses were insufficient to fully evaluate the NER/NED benefits and impacts. Recent investigations with a small-scale physical model have also indicated qualitatively that river diversions as well as alternative arrangements of navigation channels may contribute significantly to the restoration program. Environmental benefits would potentially include increased land building and maintenance and reduced hypoxia in the gulf.

This study would analyze two types of projects—large diversions (greater than 50,000 cfs [1,400 cms]) from the Mississippi River and alternative navigation channel alignments. The large- scale river diversions could potentially maximize the river's sediment and freshwater resources available for ecosystem maintenance. Diversion sites, capacities, and outfall management measures would also be assessed to help optimize diversion plans. Such massive diversions, however, may cause adverse impacts to the existing navigation channel; so alternative scenarios must be investigated to accommodate navigation needs. Alternate navigation scenarios include new channels to the east or west of the current river while providing navigation either in the new channel or by maintaining the existing navigation channel as a slack-water channel by the construction and operation of a lock system. In addition, the study would evaluate potential impacts of natural and man-made factors on the environment and economy. The study will run from FY06 through FY10 at an estimated cost of $15,350,000.

4.2.4.5 Mississippi River Hydrodynamic Study

Development of a Mississippi River Hydrodynamic Study, which would represent the existing Mississippi and Atchafalaya river systems below ORCS is necessary to properly assess the operation and parameters of the MR& river system with respect to water and sediment transport, flood control and navigation. The proposed study area encompasses the Mississippi and Atchafalaya Rivers from the ORCS to the Gulf of Mexico.

Although significant data has been collected on the amount of sediment, nutrients, and freshwater available in the river system, this information has not been assembled in a comprehensive modeling/study effort that would allow reliable estimates of the quantities of the total resources (water and sediment) that can be allocated for restoration purposes without compromising the river's existing navigation and flood control functions.

This study effort would include data collection, data synthesis, extension of existing modeling, and possibly new models. The comprehensive study would assist in determining the need, location, size, and seasonal variations for planned diversions and future restoration projects. Once a comprehensive model has been developed, calibrated, and verified for existing conditions, it would then be used to simulate a new base condition for the coastal area, one that represents/simulates the collective impacts of the near-term features and any other existing or planned projects that affect the river systems. As the average flow in the Mississippi/ Atchafalaya system is about 640,000 cfs (18,000 cms), the relatively small diversions in the near-term plan are unlikely to have a significant cumulative impact to the river system, but would become the base condition as these projects are implemented. The base condition model would then be used to evaluate the impacts of potential large-scale restoration features on the river system. In addition, the model would be used to evaluate adaptive management and potential adjustments to restoration features. This study is scheduled to begin in FY04 and end in FY07 at an estimated cost of $10,250,000.

4.2.4.6 Third Delta Study

The purpose of the Third Delta Study is to examine large-scale alternatives for the restoration of the lower areas of Terrebonne, Lafourche, and Jefferson parishes in the region of the Barataria-Terrebonne National Estuary. As proposed by Gagliano and van Beek (1999), this restoration concept involves constructing a conveyance channel parallel to Bayou Lafourche that would carry Mississippi River water and sediment to the western Barataria and eastern Terrebonne Basins in order to create two new deltas in this estuarine complex.

The Barataria-Terrebonne estuarine complex is bounded by the Mississippi and Atchafalaya Rivers. Bayou Lafourche separates this complex into two basins, Barataria Basin to the east, and Terrebonne Basin to the west. Bayou Lafourche was the main route of the Mississippi River until about 800 to 1,000 years ago. When the river changed course, Bayou Lafourche and the Lafourche delta gradually entered the final degradation phase of deltas. As such, flow from the Mississippi River down Bayou Lafourche gradually decreased until, by the mid-1800s, the bayou was a minor distributary. Prior to 1904, Bayou Lafourche maintained a hydrologic connection to the Mississippi River. Flows down the bayou were relatively small

except during large floods on the Mississippi River, but helped to maintain some areas of the estuary. When the bayou was closed off from the Mississippi River in 1904 to provide flood protection along the bayou, water quality and quantity in the bayou decreased and no longer helped sustain the estuary. In the 1950s a pumping station was constructed at Donaldsonville, to divert up to 340 cfs (10 cms) from the Mississippi River into Bayou Lafourche to help improve water quality and provide water supply along the bayou (although channel conditions limited diversions to about 200 cfs [6 cms]). Conditions in the estuary, however, continued to deteriorate.

Today this area experiences the greatest rates of land loss along the entire Louisiana coast due to the numerous factors associated with coastal loss, including the disconnection of the estuarine system from the Mississippi River, the natural subsidence of the marsh, sea level change, oil & gas exploration, channelization, salinity intrusion, etc. This endangered ecosystem serves as valuable habitat for numerous species of birds, finfish, shellfish, reptiles, amphibians, and mammals that spend all or part of their life cycle in the Barataria-Terrebonne estuary, including several species that are categorized as either threatened or endangered. The vast acreage of marsh that is being eroded also serves to protect critical oil and gas infrastructure as well as the Louisiana Highway 1 corridor connecting Port Fourchon and Grand Isle to the rest of the state and Nation.

Restoration of the lower areas of Barataria-Terrebonne, and especially the eastern Terrebonne marshes on the western side of Bayou Lafourche, has been confounded by the long distances sediment must travel from the Mississippi River. The Third Delta concept proposed by Gagliano and van Beek (1999) involves creating a new delta between the Atchafalaya River and Mississippi River Birdfoot Deltas. The proposed two new deltas would be formed by sediment carried through a constructed conveyance channel. To reduce channel construction cost and increase availability of sediment in the created delta, a pilot channel would be constructed, and natural riverine processes would erode the conveyance channel to its final design width and discharge. The conveyance channel, as proposed, would follow the eastern slope of the natural Bayou Lafourche levee system, and split into two channels near Raceland. The eastern channel would terminate in Little Lake in Barataria Basin, and the western channel would cross Bayou Lafourche and carry sediment to Terrebonne Basin, ending near the Pointe au Chein Wildlife Management Area, north of Lake Felicity and Lake Raccourci (**figure MR 4-4**).

The State of Louisiana has conducted initial engineering studies of the Third Delta concept and concluded that the concept as proposed by Gagliano and van Beek (1999) could be engineeringly feasible, although serious concerns remain regarding the time scale and spatial extent of land building, the destruction of valuable swamps and marshes within the path of the conveyance channel, and the drastic alterations of the estuarine character of the receiving areas. In developing the feasibility study, the LCA Program would proceed with three additional phases: identifying alternatives to the proposed concept that would attain project goals, analyzing the significant environmental and economic effects of each alternative, and determining the economic feasibility of implementing the best project alternative. Potential alternatives include alternate diversion routes, the use of dedicated dredging, pipeline conveyance of sediment from the Mississippi River, and diverting water from the Atchafalaya River into Terrebonne Basin. As this study progresses, assessment tools developed under the

Mississippi River Hydrodynamic Study, previously discussed, would be used to evaluate the water and sediment transport capabilities of the alternative plans evaluated. Restoration of the Western Barataria-Eastern Terrebonne estuarine complex is challenging because of its remote location relative to the Mississippi and Atchafalaya Rivers. Yet, successfully restoring this region is crucial to the long-term sustainability not only of the coastal wetlands, but also to the sustainability of one of the world's most productive fisheries, and to protection of communities and infrastructure that is vital not only to the State of Louisiana, but also the Nation.

The study is currently underway through efforts funded by the State of Louisiana and would conclude in FY10, at an estimated cost of $15,290,000.

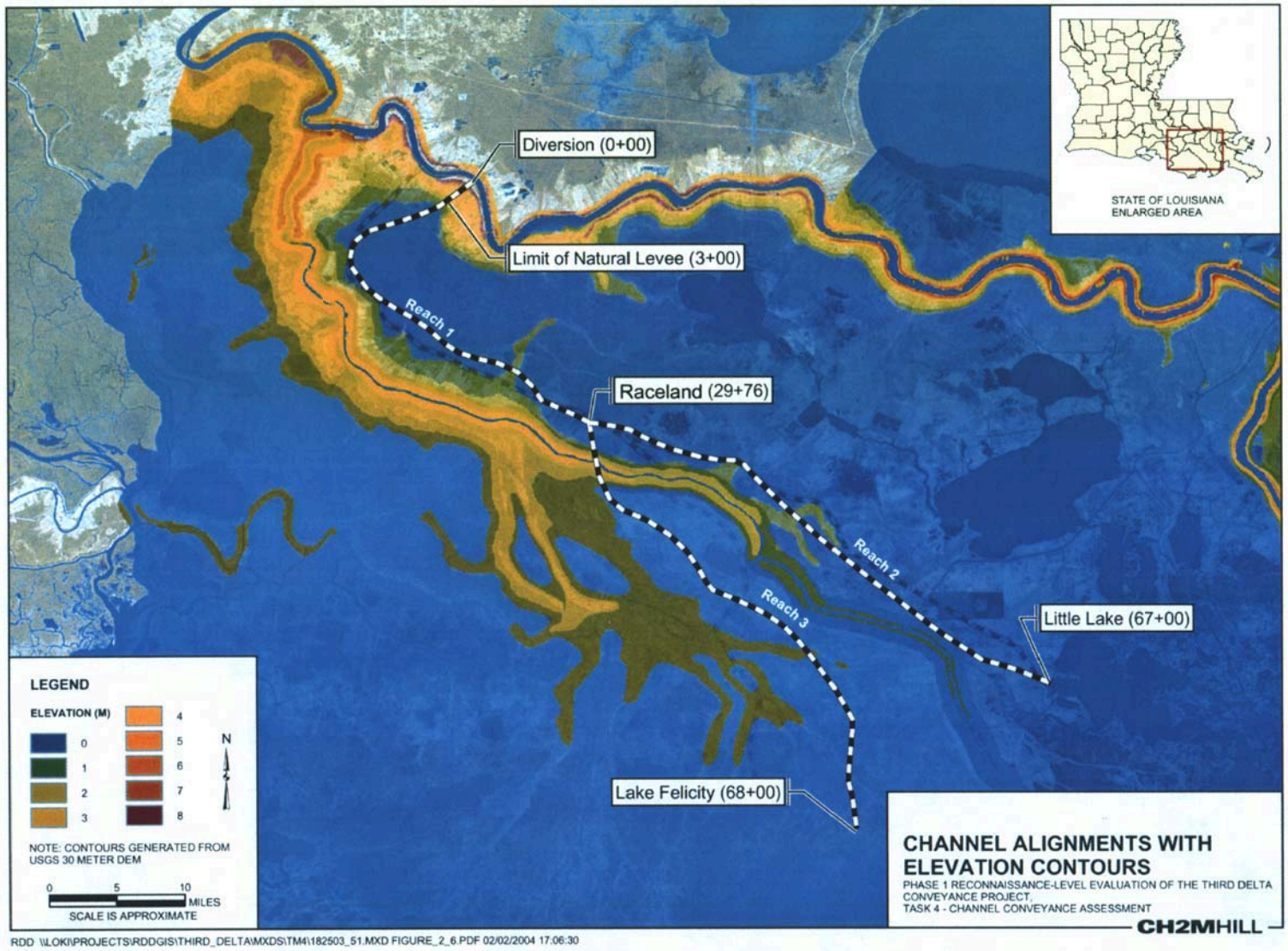

Figure MR 4-4 Location of proposed conveyance channel for the Third Delta Study (LDNR, 2004).

4.2.5 Science and Technology (S&T) Program

Section 3.1 PLANNING CONSTRAINTS detailed the key scientific uncertainties and engineering technology challenges in LCA implementation. Appendix A SCIENCE AND TECHNOLOGY PROGRAM details the proposed plan and program to resolve these challenges and facilitate effective implementation. It is proposed that a 10-year Science and Technology S&T (S&T) Program be funded as an authorized item subject to construction cost share percentages (65 percent Federal and 35 percent non-Federal would be applied for construction features and the S&T Program) at a total amount not to exceed $100 million. A major component of the S&T Program would be programmatic authorization for demonstration projects.

The LCA S&T Program would provide a strategy, organizational structure, and process to facilitate integration of science and technology into the decision-making processes of the Program Management and the Program Execution Teams. Implementation of this S&T Program would ensure that the best available science and technology are available for use in the planning, design, construction, and operation of LCA Plan features, as well as other coastal restoration projects and programs, such as CWPPRA. There are five primary elements in the S&T Program (outlined in the S&T Plan) and each element has a different emphasis and requirement. These include: (1) S&T Information Needs, (2) Data Acquisition and Monitoring, (3) Data and Information Management, (4) Modeling and AEAM, and (5) Research. Determining S&T needs requires a continuous process in place that solicits such needs from Program Managers, the PET, and scientists. Data Acquisition and Monitoring require standard operating procedures and rigorous adherence to those standards. Data and Information Management requires standards and procedures to assure data can be shared or compiled from a variety of sources. Modeling and AEAM requires broad interactions among scientists, Program Management, and the PET. Research requires clear hypothesis testing and a substantial degree of scientific independence but close coordination with the PET. A systematic process would be established to provide minimum standards for data quality and data management for information received and used by LCA.

The LCA S&T Program would perform the following:

- Work with LCA Program Management and the LCA PET to review and assess goals, objectives, and key documents of the LCA Program, Identify S&T needs to assist the LCA Plan in meeting those goals and objectives;
- Establish and maintain independent science and technology advisory and review boards;
- Manage and coordinate science projects for (1) data acquisition and monitoring, (2) data management, (3) modeling, and (4) research to meet identified scientific needs of the LCA Plan;
- Coordinate with other research efforts, such as CREST program; the Louisiana Governor's Applied Coastal Research and Development Program, and other state and Federal R&D entities;

- Incorporate lessons learned and experiences (pros and cons) of other large-scale ecosystem restoration science and engineering programs such as the Everglades, Chesapeake Bay, and Calfed;
- Conduct scientific evaluations, assessments and peer reviews to assure that the science implemented, conducted or produced by the S&T Program meets an acceptable standard of quality, credibility, and integrity;
- Establish performance measures for restoration projects and monitor and evaluate the performance of program elements;
- Improve scientific understanding of coastal restoration issues within the context of AEAM, infuse this improved information into planned or future restoration planning, projects and processes conducted by the PET;
- Prepare scientific documents including a periodic Science and Technology Report and conduct technical workshops and conferences; and
- Provide reports on science projects to support the Government Performance and Results Act (GPRA).

Monies allocated for the S&T Program would be used to:

- Establish and staff the S&T Office;
- Develop, implement and maintain a comprehensive data management structure and process;
- Establish, in concert with the CRMS, key monitoring stations to collect critical baseline data for planned projects and long-term monitoring of ecosystem status and trends;
- Identify key S&T uncertainties and focus efforts (e.g. monitoring and assessment, demonstration projects, research) to resolve them; and
- Develop analytical tools (i.e., hydrodynamic, ecological, and socioeconomic models) to help the Program Execution Team more effectively predict potential feature outcomes

Data collection and monitoring and assessment efforts to fully support the implementation of the LCA Plan and the S&T Program would require extensive collaboration between and funding support from Federal and state agencies, NGOs, and universities. Further details regarding the S&T Program can be found in appendix A: SCIENCE AND TECHNOLOGY PROGRAM.

4.2.6 Programmatic Authorization for Demonstration Projects

The purpose of LCA S&T Program demonstration projects is to resolve critical areas of scientific, technical, or engineering uncertainty while providing meaningful restoration benefits whenever possible. After design, construction, monitoring, and assessment of individual demonstration projects, the LCA Program would leverage the lessons learned to improve the planning, design, and implementation of other Louisiana coastal zone restoration projects.

There are numerous types of uncertainties to be addressed to support and improve LCA restoration efforts. Each uncertainty requires a different resolution strategy, based on the effects of the uncertainty on the program, degree of uncertainty, cost of addressing the uncertainty, and importance of reducing the uncertainty. Different strategies for resolving uncertainties may include, focused research projects, focused monitoring of existing projects or natural conditions, or demonstration projects.

Uncertainties may be related to basic understanding of the data availability, science, modeling, and other analytical tools, socio-economic impacts, implementation, technical methodology, resource constraints, cost, or effectiveness of restoration features. Uncertainties may also be related to development and refinement of forecasting tools. An uncertainty is considered critical if its resolution is vital to advancing the planning and implementation of the LCA Plan in the near-term. A role of the S&T Program is to identify and prioritize critical areas of uncertainty, to formulate the most appropriate means of resolving uncertainties, to ensure focused data collection aimed at resolving these areas of uncertainty, and to make recommendations to LCA Program Management regarding program and project refinements in light of the reduced uncertainty.

Critical areas of uncertainty identified by the PET, academics, or agency personnel would be proposed to the S&T Office Director. Proposed areas of uncertainty should be identified in relation to anticipated program activities. However, the S&T Office would not be constrained to targeting only these needs, and would be open to facilitating the pursuit of new technology, experimentation, and innovative ideas when suitable for the advancement of the LCA Program.

Areas of uncertainty would be prioritized based on the relative importance of resolution of the uncertainty to advancing the LCA Program. The S&T Office Director would be responsible for determining the significance of the uncertainties relative to the advancement of the LCA Program in coordination with Program Management and the PET.

Demonstration projects represent one of several strategies that the S&T Office would employ to reduce uncertainties. Demonstration projects may be necessary to address uncertainties not yet known and discovered in the course of individual project implementation or during the course of studies of large-scale and long-term restoration concepts. The Program Manager would review and approve requests from the S&T Director to prepare decision documents of potential demonstration projects. In addition to standard decision document information, the demonstration project decision documents would clearly identify major scientific or technological uncertainties to be resolved and a monitoring and assessment plan to ensure that the demonstration project would provide results that contribute to overall LCA Program effectiveness. Once the completed decision document is approved by the Secretary of the Army, construction could begin.

It is proposed that demonstration projects developed by the S&T Program be funded as a construction item at an amount not to exceed $100 million over 10 years, including a maximum cost of $25 million per project. The PDT developed five initial candidate demonstration projects, but these may be modified or replaced by demonstration projects of higher priority as determined by the S&T Director. In order to support continued development of the LCA Plan

through AEAM, it is possible that additional and/or different demonstration projects would be needed.

The S&T Office would be responsible for defining and developing all demonstration projects to answer key ecological or technological uncertainties. A short description of some potential demonstration projects is provided below. The potential projects illustrate the general scope and purpose of the demonstration project's concept, but are not intended to represent the only demonstration projects that would be developed once the S&T Office is established.

4.2.6.1 Demonstration Project 1 – Marsh restoration and/or creation using non-native sediment

Uncertainty Addressed: This demonstration project would address the uncertainty involved in selecting sources of material for marsh creation, restoration of maritime forests, and restoration of cheniers. There is uncertainty regarding the efficacy of using saline mineral soils to support these habitats. Uncertainties regarding the time required for soil to leach out salts and increase organic matter content in order to make the soils suitable for the establishment of freshwater and terrestrial vegetation would need to be resolved prior to using this technique on a large scale. Other uncertainties include the cost of restoring cheniers and the potential benefits, such as habitat functionality.

Background: Coastal cheniers are critical habitats for many wildlife populations, especially migratory birds; however, these habitats are disappearing rapidly and are designated as critically imperiled by the Louisiana Natural Heritage Program. These chenier habitats provide upland habitat in very close proximity to marshes, which is instrumental in creating diverse upland/wetland assemblages. In addition to providing critical habitat, natural ridges, such as cheniers and natural distributary ridges, provide additional levels of flood protection. In spite of these potential benefits, coastal restoration programs in Louisiana have relatively little experience with chenier restoration.

Because marsh creation and chenier and maritime forest restoration are hampered by the availability of sediment that contains soil characteristics similar to the native soils (most available sediment is located in salt water offshore), it is important to determine the best methods of amending dredged sediment to create soils capable of sustaining this specialized habitat.

Description: This demonstration project could be located in the southwestern Barataria Basin, just north of Port Fourchon, in the "Chenier Unit" of the partially completed Barataria Basin Marsh Creation Study although the specific location of the project would not be selected until careful examination by the S&T Office in consultation with the Program Execution Team. This demonstration project would use different methods of soil modification and planting regimes to determine the quickest and most cost-effective, reliable means of attaining viable soils. A wide variety of variables selected by the S&T Office would be monitored to determine plant productivity, landform stability, and to evaluate impacts related to the acquisition of borrow material and its effect on the local ecosystem.

Anticipated Outputs: This demonstration project would provide insight into appropriate sources of available substrates, cost effective transport mechanisms, and time requirements for vegetation establishment on coastal cheniers. Documentation of impacts related to the acquisition of borrow materials and its effect on the affected area ecosystems would also be provided. This would enable more effective restoration of these habitat types in other areas of the coast.

4.2.6.2 Demonstration Project 2 – Marsh restoration using long-distance conveyance of sediment

Uncertainty Addressed: This demonstration project would address the uncertainty involved in marsh restoration through long distance conveyance of sediment via pipeline. Two major components of the demo will be examined: 1) most cost-effective mechanisms for long distance transport, and 2) most effective disposal of transported material to enhance land bridge and marsh construction. Concerns about the cost effectiveness of using conventional dredging techniques to transport large quantities of sediment long distances from sediment sources must be addressed. Conventional dredging equipment typically requires large pipelines for transport of sediment. However, there are uncertainties about how the material can be effectively transported efficiently over long distances and distributed. Variability in the sections of the restored marsh would facilitate monitoring to determine optimal final grade vs. design grade, dewatering periods, and potential water quality effects of transported materials. Tests may also be conducted to assess a two-tiered approach whereby large pipeline systems are used to convey high volumes of material but smaller dredges could be used to then disperse the material into final locations. Different mechanisms to distribute transported sediment within the marsh environment to minimize marsh damage and establish appropriate elevations for sustainable land bridge formation and marsh development would also be examined.

Background: Although modeling results indicate that very large diversions (e.g., 100,000 cfs [2,800 cms]) would build tremendous amounts of land; these results also indicate that such diversions would greatly alter the receiving basin's ecosystem. Furthermore, certain areas of the coastal zone that have experienced the greatest land loss may ultimately prove to be too far removed from the Mississippi or Atchafalaya Rivers for diversions to be a viable restoration technique. Long-distance sediment delivery via pipeline for marsh restoration is a promising alternative to very large diversions.

Dredged sediment is currently used for marsh creation; however, the scale is relatively small and the marsh creation sites are relatively close to the source of the material. Marsh nourishment is the concept of applying sediment to degrading marsh surfaces either by flowing low sediment concentration slurries over the surface or by direct spray disposal. These techniques have been shown to be effective on very small scales, but application to large areas is unproven and presents several challenges. These challenges include the logistics of moving material over and onto existing deteriorating marsh while minimizing damage, the need and methods to ensure vegetation colonization, and the cost-effectiveness of this restoration technique. Because marsh creation and nourishment have been shown to be successful on small, localized scales, the application of this technique on a larger scale makes it an excellent candidate for a demonstration project.

Description: This demonstration project would be located in the vicinity of a degrading land bridge. The specific location would be identified after the S&T Office is established. Techniques to be demonstrated may include spray disposal of dredged sediment to create marsh platforms in open water areas and application of thin sediment slurries over existing degrading marsh. Sources of material may be from offshore areas or from routine navigation channel maintenance dredging.

Anticipated Outputs: Results from this demonstration project would be used to determine the viability of transporting sediment slurries over long distances via pipeline for marsh restoration. Determination of cost-effectiveness would relate to the future use of these techniques. This project is further justified as a demonstration project because results can inform the appropriate design and cost estimates when these techniques are included as alternatives in large feasibility studies. Lessons learned from this demo project would be applicable to other dredging activities throughout the nation. Additionally, lessons learned from this demonstration project could be applied to improve the performance of beneficial use programs associated with the LCA Study and other efforts throughout the nation.

4.2.6.3 Demonstration Project 3 – Canal restoration using different methods

Uncertainty Addressed: This demonstration project would address uncertainties involved in restoration of canals. Canals, cut throughout the coastal marshes to support navigation, and oil and gas exploration needs, have resulted in fragmentation and accelerated erosion of many of the marshes. Considerable uncertainty exists and continues to be debated regarding the most effective approach to restoring existing canals. There are also uncertainties regarding the viability of restoration efforts and the timing of restoration.

Background: Many scientific papers suggest that these canals are one of the primary contributors to the land loss problem in coastal Louisiana. In addition to the direct removal of wetlands caused by their construction including dredged material banks, these canals have caused secondary indirect impacts by altering the natural hydrology of marshes and by accelerating erosion rates along the canal banks. The dredged material banks associated with these canals prevent the introduction of sediment and nutrients and cause artificially prolonged flooding. These effects combine to eliminate soil-building processes necessary to counteract subsidence. Additionally, canals provide avenues for higher salinity water to move into previously freshwater marshes, which ultimately leads to land loss. This demonstration project would address the many uncertainties related to canal restoration. The optimum method for closing these canals remains uncertain, but the intended outcome is known. In order to be sustainable, the linkage between wetlands and new sediment and nutrient sources must be reestablished. Thus, it must be demonstrated that the action taken is capable of attaining the desired ecological response by minimizing further erosion along the canal banks and by reestablishing historic hydrologic conditions.

Description: This demonstration project would be constructed in locations in both Barataria and Terrebonne basins, as these areas have some of the highest concentrations of

canals. Different approaches to restoration should be examined and monitored including: 1) backfill with small hydraulic or mechanical dredge; 2) placing gaps in the excavated material disposal banks to restore natural hydrology; and 3) constructing plugs at canal entrances as stand alone features to reduce erosion within the canal. If backfill is used, impacts related to the acquisition of borrow material and its effect on the local ecosystem must also be addressed. The S&T Program may recommend additional restoration approaches to carry out this demonstration project or recommend further demonstration projects that build on or expand upon this demonstration project.

Anticipated Outputs: This demonstration project has implications for restoration throughout the entire coast of Louisiana. Once the most beneficial techniques have been identified and costs have been determined, these actions could be implemented as part of the restoration strategies for every subprovince. Any procedures for successful restoration of unused canals resulting from this demonstration project may be shared with regulatory agencies and departments for future permit actions.

4.2.6.4 Demonstration Project 4 – Shoreline erosion prevention using different methods

Uncertainty Addressed: This demonstration project would address uncertainties involved in restoration of eroding shorelines throughout the coastal area. Erosion along open bays and channels has lead to wetland losses across the coast. Different approaches to impede future erosion would be examined and monitored for long-term effectiveness, sustainability, and costs. Project monitoring would include comparative evaluations of settlement occurring within the various erosion protection/foreshore protection features.

Description: This demonstration project would be implemented through construction and monitoring of a variety of erosion protection/foreshore protection features in a variety of foundation conditions. This demonstration project would be constructed along several different reaches of shoreline subject to different wave energy regimes.

Anticipated Outputs: Results from this demonstration project would be used to determine the most efficient means of erosion protection/foreshore protection for different foundation conditions and wave energies. The findings from this demonstration project would be applicable to restoration efforts associated with shoreline erosion control. Once the most beneficial techniques have been identified and costs have been determined, these actions could be implemented as part of restoration strategies for the coastal areas

4.2.6.5 Demonstration Project 5 – Barrier island restoration using offshore and riverine sources of sediment

Uncertainty Addressed: This demonstration project would address uncertainties involved in restoration of barrier islands with offshore or riverine sources of sand. Focused research and restoration projects already completed in the LCA have contributed to an understanding about the most effective and sustainable island geometry design. However, several issues remain

regarding the potential sources of the large quantities of sediment that would be required to re-establish or restore coastal barrier islands. Two sand sources already identified are Ship Shoal and the Lower Mississippi River. Uncertainties related to Ship Shoal are the quantity of available material and the cost-effectiveness of transporting this source relative to other sources. The sources of sands must be quantified and different transport mechanisms tested to determine a cost-effective approach to establishment. Demonstration project test sections would also vary in the types of sediment (percentage of sand/silt/clay) used for barrier islands and back barrier marsh creation. Monitoring would focus on vegetation growth and island stability.

Background: Barrier islands are critical land features in the Louisiana coastal area acting as the first line of defense from daily wave energies in the Gulf of Mexico and from less frequent hurricanes. The islands have been proved to reduce wave height and energy resulting in storm surge protection for coastal communities, but more importantly, the barrier islands provide protection from everyday wave activity; thereby promoting an environment that is conducive to marsh formation and sustainability. The islands also provide critical habitat to numerous species of wildlife, including specialized habitat required for rookeries of endangered brown pelicans. As barrier islands disappear, so do the invaluable services they provide.

Sediment resources located in the open Gulf of Mexico in shallow water are potentially major sources of high quality sand for barrier island restoration. Dredge equipment used for barrier island restoration is available primarily during the winter months. However, open gulf conditions in the winter months limit the ability of typical dredge operations in shallow conditions.

Costs and logistics of dredge operations on a busy commercial channel (the Mississippi) and the feasibility of pumping sediment long distances through a pipeline are difficult to estimate reliably. Other issues are associated with obtaining sediment, such as from Mississippi River point bars, including the renewability of the resource and the effects of removal from the point bars on river currents and navigation. This issue would be answered in part through the demonstration project directed at investigating the pipeline delivery of sediment. This demonstration project would more closely investigate methods associated with barrier island configuration, sediment placement, and habitat configurations (e.g. percent dune to marsh).

Description: This demonstration project would be constructed along sections of the Terrebonne and Barataria barrier islands.

Cost-effective techniques that would be feasible in difficult weather conditions need to be developed to capture and transport sediment from offshore sand bodies to a barrier island restoration site.

Construction of a sediment trap, potentially in the vicinity of the Head of Passes, may also be considered. This would potentially provide a renewable source of large-grained sediment, which could then be dredged and pumped through a pipeline delivery system to restoration sites. Initial construction of the sediment trap would also provide significant volumes of sand that could be used for restoration purposes. Second, sediment from point bars in the Mississippi River may be mined and pumped through a pipeline for delivery to restoration sites.

Anticipated Outputs: The expected output is to determine a viable source of large quantities of material and based on its source and composition the best method of use. Once uncertainties are resolved, these potential borrow sources would be incorporated more fully into future designs of restoration projects in both the Barataria and Terrebonne barrier shorelines.

4.2.7 Programmatic Authorization for the Beneficial Use of Dredged Material

The District has the largest annual channel O&M program in the USACE, with an annual average of 70 mcy (54 million cubic meters) of material dredged. Currently, approximately 14.5 mcy (11.1 million cubic meters) of this material is used beneficially in the surrounding environment with funding from either the O&M program itself or the Continuing Authorities Program (CAP) defined by the WRDA 1992 Section 204 for beneficial use of dredged material. Within the O&M program, beneficial use may be funded if the cost increment increase for the beneficial use transport and disposal is a minimal percentage increase above the O&M Base Plan for standard transport and disposal. The CAP Section 204 provides another funding source to "carry out projects for the protection, restoration, and creation of aquatic and ecologically related habitats, including wetlands, in conjunction with dredging for construction, operation, or maintenance by the Secretary [of the Army] of an authorized navigation project." Section 204 projects are completed in conjunction with existing O&M contracts and pay for the incremental cost above the Base Plan for the beneficial use alternative. The Base Plan is defined as "Disposal of dredged material … in the least costly manner consistent with sound engineering practice and meeting all Federal environmental requirements." Combined, the existing O&M program and the CAP Section 204 (with $15 million in annual funding spread throughout USACE) do not provide the resources for the District to take full advantage of the available sediment resources.

The LCA Plan would be enhanced by programmatic authorization for beneficial use of dredged material. This program would allow the District to take greater advantage of existing sediment resources made available by maintenance activities to achieve restoration objectives. Annualized, there is reasonable potential to use an additional 30 mcy (23 million cubic meters) of material beneficially if funding were made available. (A portion of the average annual material total of 70 mcy (54 million cubic meters) is not available for beneficial use because it is resuspended material from upstream maintenance; if taken out of the system upstream, it is not available for downstream beneficial use.) Other limitations within particular areas include threatened and endangered species operating restrictions; cultural resource site operating restrictions; and unfavorable maritime working conditions. The following list is a small subset of the many areas with significant opportunity for additional beneficial use of material in coastal Louisiana:

- The MRGO, LA, project;
- The bay reach of the Barataria Bay Waterway, LA project;
- The MR&T project, Head of Passes and Southwest Pass;
- The Atchafalaya River and Bayous Chene, Boeuf, and Black, LA, project;
- The inland reach of the Calcasieu River and Pass, LA, project; and
- The Houma Navigation Canal.

The LCA Plan recommends $100 million in programmatic authority to allow for the extra cost needed for beneficial use of dredged material. Funds from the Beneficial Use of Dredge Material Program would be used for restoration activities that are above and beyond what would otherwise be funded by the USACE O&M program. Approximately 15 percent would be used for feasibility studies, and the remaining $85 million would be used for placement of dredged material within the acquired disposal sites. Previous Section 204 projects have demonstrated an incremental cost of $1.00 per CY for placement. Additionally, these projects have demonstrated approximately 0.00025 acres per CY (0.0001 ha per CY) created. Based on the requested funds and a ten-year period of implementation, it is expected that the LCA beneficial use of dredged material could attain approximately 21,000 acres (8,500 acres) of newly created wetlands. This beneficial use program represents a vital opportunity to contribute to the attainment of the LCA objectives. Programmatic authority would allow for the application of funds appropriated for LCA for beneficial use of dredged material under guidelines established by the Secretary of the Army, which may be similar to the current guidelines specified for the Section 204 Continuing Authorities Program. Approval of individual beneficial use projects may be delegated by the Secretary of the Army and managed by Division based on the appropriated annual funds. Implementation would proceed with a more detailed analysis of the potential beneficial use disposal sites. Additional funds should not exceed $100 million over the initial 10 years of the LCA program and would greatly contribute to achieving restoration objectives by utilizing existing sediment resources from coastal zone navigation channels.

4.2.8 Programmatic Authorization for Investigations of Modifications of Existing Structures

Coastal Louisiana is a dynamic environment that requires continual adaptation of restoration plans. With this recognition, opportunities for modifying or rehabilitating existing structures and/or their operation management plans to contribute to the LCA ecosystem restoration objectives may be required in the future. Examples of existing structures include: Davis Pond, Bonnet Carre Spillway, MRGO, Bayou Sorrel Lock, and Leland Bowman Lock. Each of these structures may be modified to influence flow, stage, and/or water quality.

Initiation of investigations of modifications of existing structures requires advanced budgeting. Standard budget sequencing may limit responsiveness to recommendations made within the LCA Plan. As a result, the LCA Plan seeks programmatic authorities to initiate investigations of modifications of existing structures utilizing funds within the LCA appropriations, not to exceed $10 million.

4.2.9 Cost Estimates for Components of the LCA Plan

Estimated costs for each of component of the LCA Plan are shown in **table MR 4-17**. Cost estimates are based on June 2004 price levels.

The fully funded cost estimate of the five near-term critical restoration features are as follows:

- MRGO Environmental Restoration Features $121,736,000
- Small Diversion at Hope Canal $ 80,281,000
- Barataria Basin Barrier Shoreline Restoration $275,471,000
- Small Bayou Lafourche Reintroduction $167,582,000
- Medium Diversion with Dedicated Dredging at Myrtle Grove $340,311,000

The fully funded cost estimate for the LCA Plan is $2,323,653,000.

Table MR-4-17
LCA Plan Component Cost Estimates
(June 2004 Price Levels)

Item		Cost ($)
MRGO environmental restoration features		$ 80,000,000
Small diversion at Hope Canal		$ 10,645,000
Barataria Basin Barrier shoreline restoration		$ 181,000,000
Small Bayou Lafourche reintroduction		$ 75,280,000
Medium diversion with dedicated dredging at Myrtle Grove		$ 142,920,000
	SUBTOTAL	$ 489,845,000
LERRD		$ 178,619,000
First Cost	SUBTOTAL	$ 668,464,000
Feasibility-Level Decision Documents		$ 54,673,000
Preconstruction, Engineering, and Design (PED)		$ 36,252,000
Engineering and Design (E&D)		$ 29,018,000
Supervision and Administration (S&A)		$ 68,973,000
Project Monitoring		$ 6,685,000
Conditionally Authorized Cost	SUBTOTAL	**$ 864,065,000**
Science & Technology Program Cost (10 year Program)		**$ 100,000,000**
Demonstration Program Cost (10 year Program)*		**$ 100,000,000**
Beneficial Use of Dredged Material Program*		**$ 100,000,000**
Investigations of Modifications of Existing Structures		**$ 10,000,000**
Total Authorized LCA Plan Cost		**$ 1,174,065,000**
Multi-purpose operation of Houma Navigation Canal (HNC) Lock [#]		$ -
Terrebonne Basin Barrier shoreline restoration		$ 84,850,000
Maintain Land Bridge between Caillou Lake and Gulf of Mexico		$ 41,000,000
Small diversion at Convent / Blind River.		$ 28,564,000
Increase Amite River Diversion Canal influence by gapping banks		$ 2,855,000
Medium diversion at White's Ditch		$ 35,200,000
Stabilize Gulf shoreline at Point Au Fer Island		$ 32,000,000
Convey Atchafalaya River Water to Northern Terrebonne marshes		$ 132,200,000
Modification of Caernarvon diversion		$ 1,800,000
Modification of Davis Pond diversion		$ 1,800,000
	SUBTOTAL	$ 360,269,000
LERRD		$ 208,100,000
First Cost	SUBTOTAL	$ 568,369,000
Feasibility Level Decision Documents		$ 47,529,000
Preconstruction, Engineering, and Design (PED)		$ 36,027,000
Engineering & Design (E&D)		$ 45,635,000
Supervision & Administration (S&A)		$ 58,673,000
Project Monitoring		$ 5,683,000
Approved Projects Requiring Future Congressional Authorization for Construction		**$ 761,916,000**
Mississippi River Hydrodynamic Study		$ 10,250,000
Mississippi River Delta Management Study		$ 15,350,000
Third Delta Study		$ 15,290,000
Chenier Plain Freshwater and Sediment Management and Allocation Reassessment Study		$ 12,000,000
Acadiana Bays Estuarine Restoration Feasibility Study		$ 7,110,000
Upper Atchafalaya Basin Study^		$ -
Large-scale and Long Term Studies Cost	SUBTOTAL	**$ 60,000,000**
Total LCA Restoration Plan Cost		**$ 1,995,981,000**

*Program total costs include any estimated Real Estate costs for these activities
[#] Feature of the Mississippi River and Tributaries, Morganza Louisiana to the Gulf of Mexico Hurricane Protection project
^ Study to be funded under the Mississippi River and Tributaries authority

4.3 PLAN MANAGEMENT

The purpose of the LCA Management Plan (Management Plan) is to maximize attainment of the planning objectives for restoration of Louisiana's coastal wetlands. This management plan and structure describe how various entities would be integrated into the planning and decision-making process during the LCA Plan implementation. This proposed management structure would also facilitate communication and coordination between the Federal and state agencies in the implementation of broader coastal restoration efforts and programs.

This section of the report describes the working relationships between the various entities and their respective roles and responsibilities to facilitate efficient management of coastal restoration activities. Due to the significance and magnitude of wetlands losses and the far-reaching national extent of the problems generated by coastal Louisiana land losses over the next 50 years, a Washington-level Task Force is needed to fully address the issues.

For each of the groups involved in the implementation of the LCA Program (**figure MR 4-5**), the purpose, structure, and roles and responsibilities are described. The groups include: Headquarters, a Program Management Team, a Program Execution Team, a proposed Task Force, the Assistant Secretary, a Regional Working Group, and a S&T Office. **Figure MR 4-5** depicts their overall relationship and the interaction that would be needed to achieve coastal restoration and consistency.

Management of the LCA restoration efforts would also include a decision support system that relies on clearly defined procedures to assess uncertainties and develop alternatives for the decision making process. The decision support system would be developed with and implemented by the program teams, and outputs from the system would be reported to the Program Management Team, who would be responsible for program-level decisions. The decision support system would be developed to explicitly identify constraints and tradeoffs among new projects, existing and backlogged projects and other planning and regulatory decisions made that affect the implementation and effectiveness of restoration efforts. Program planning efforts would support informed decision making in recognition of the interdependencies among actions and the tradeoffs in outcomes affecting the recreational and commercial uses of the working coast.

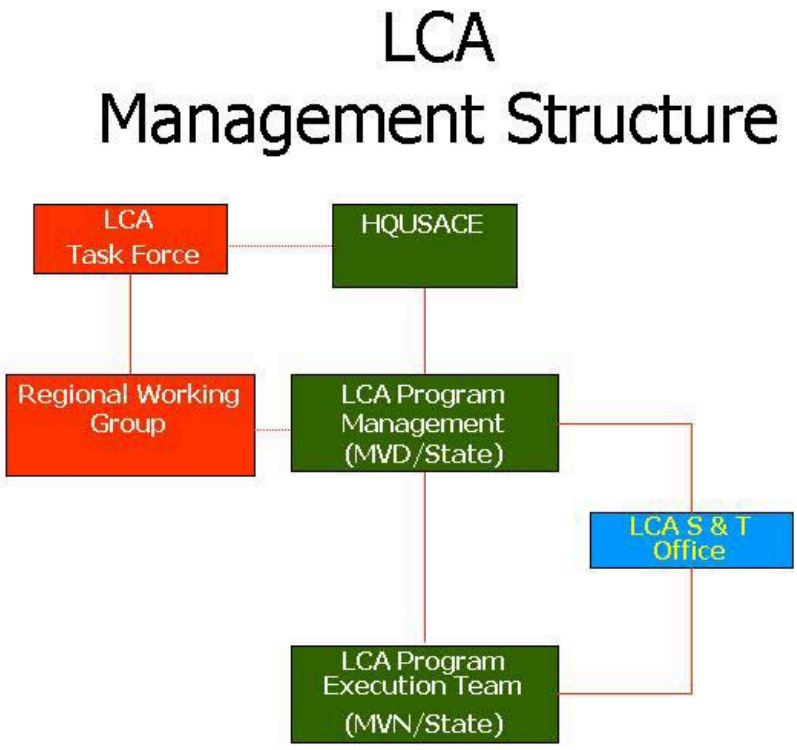

Figure MR 4-5. Coastal Restoration Management Structure.

4.3.1 Headquarters, US Army Corps of Engineers

Headquarters would provide leadership in policy review, compliance, and funding strategies for Louisiana coastal restoration. Headquarters formed an interdisciplinary regional integration team that would participate in the study, comprised of policy, planning, and programs staff. Headquarters would also:

- Expedite review and policy decisions;
- Coordinate with agencies at the Washington level;
- Provide leadership in the resolution of issues;
- Recommend approval to the Secretary of the Army for annual LCA budget requirements;
- Prepare Chief's reports for obtaining authorizations;
- Review requests for approval under programmatic authority; and
- Provide lead for administrative support to the Task Force.

4.3.2 Program Management Team

The Program Management Team would include representatives from Division, the State of Louisiana, and the S&T Office. With the support of the Program Management Team, the Program Manager (Commander, Mississippi Valley Division/President, Mississippi River

Commission) would manage the LCA program in close coordination with the State of Louisiana, and perform the following duties:

- Coordinate interagency program efforts through RWG forum;
- Complete upward reporting requirements to Headquarters;
- Submit the annual LCA program budget to Headquarters;
- Provide annual program funding to the Program Execution Team with program execution guidance;
- Review annual AEAM and program reports to develop future programmatic guidance;
- Approve S&T Office efforts in support of the LCA Program;
- Prioritize S&T Office efforts in support of on-going studies and construction;
- Support the District's need for technical resources within and outside the Division including independent technical review teams;
- Provide reports to the Task Force on LCA Program activities and execution;
- Participate in issue resolution conferences, alternative formulation briefings, teleconferences and other formal briefings;
- Provide leadership in ensuring quality assurance and policy compliance; and
- Establish program review teams as necessary.

4.3.3 Program Execution Team

The purpose of the Program Execution Team is to formulate, design, and implement the LCA Plan components. It would also provide a forum for the many Federal and state agencies working on coastal restoration efforts to interact and to share resources.

The District and the state (through LDNR) lead the Program Execution Team. The Program Execution Team would oversee and execute all project level coastal restoration activities. The overall Program Execution Team would include additional Federal and state agency members. The members of the team would efficiently and expeditiously manage studies and construction through appropriate implementation strategies. Each organization brings to the team a particular area(s) of expertise.

The Program Execution Team may make recommendations that it deems warranted to the District Engineer on matters that the Program Execution Team generally oversees and executes, including suggestions to avoid potential sources of dispute. The Government in good faith shall consider the recommendations of the Program Execution Team. The Government has the discretion to accept, reject, or modify the Program Execution Team's recommendations.

Team members would assist in the preparation of reports and the reports' submission to the Program Management Team. One specific reporting responsibility of the Program Execution Team would be the Program Report to Congress (RTC). The purpose of the RTC would be to provide Congress with 1) the status and progress of implementation of the LCA Plan, 2) any recommended changes to procedures for implementing the LCA Plan, 3) changes to the scope, cost, and structure of the LCA Plan, including the addition or removal of projects, 4)

recommendations to improve the overall execution and management of the plan, and 5) any other information or recommendations regarding the plan. A RTC would be prepared by the Division and the District, in collaboration with the state, and would be approved by Headquarters and the Secretary of the Army prior to submittal to Congress.

The Program Execution Team would make recommendations to the District Engineer and the Program Manager for the following:

- Coordinate and conduct coastal consistency review of reports and documents for all District activities (i.e. feasibility reports) in the Louisiana coastal area;
- Prepare LCA Program Reports to Congress as required (for approval through the Program Manager;
- Prepare project cost share agreements for approval and execution by designated authority;
- Produce Project Management Plans (PMPs), Project decision documents/Feasibility Reports for approval and/or authorization of projects;
- Dialogue with the S&T Office during scoping of feasibility studies to identify S&T support requirements;
- Produce PED scope documents, Plans & Specifications (P&S), and environmental compliance documents;
- Review periodic AEAM monitoring reports, provide recommendations to the Program Manager, and implement guidance provided;
- Conduct all scoping meetings, public information meetings, and issue resolution activities;
- Prepare the Program Execution annual budget; and
- Submit the consolidated Program Execution and Science and Technology budget to the Program Manager.

4.3.4 Coastal Louisiana Ecosystem Protection and Restoration Task Force

The purpose of the proposed Task Force would be to facilitate coordination and collaboration among various agencies involved in implementation of major coastal restoration activities and provide recommendations to the Secretary of the Army. The Task Force would be formed by specific Congressional authorization.

The Task Force would include the following members or designees - in the case of a Federal agency, members or designees would be at the level of an Assistant Secretary:

- The Secretary of the Army, who shall serve as Chairperson;
- The Secretary of Interior;
- The Secretary of Commerce;
- The Administrator of the Environmental Protection Agency;
- The Secretary of Agriculture;
- The Secretary of Transportation;
- The Secretary of Energy;

- The Secretary of Homeland Security; and
- The Governor of the State of Louisiana

The Task Force would meet to discuss actions and recommendations to the Secretary of the Army regarding:

- Policies, strategies, plans, programs, projects, and activities for addressing the conservation, protection, restoration, and maintenance of the Coastal Louisiana Ecosystem;
- Integrated financial plans of the agencies represented on the Task Force. Such recommendations shall identity funds from available existing programs, and include recommendations for coordinated budget requests;
- Submission of a biennial report to Congress that summarizes the activities of the Task Force;
- Task Force actions to facilitate public participation, including providing advance notice of meetings, providing adequate opportunity for public input and comment, maintaining appropriate records, and making available a record of proceedings for public inspection.

4.3.5 Secretary of the Army

The Secretary of the Army, or his designee, would serve as the chair of the Task Force and would ultimately be responsible for recommendations to Congress on authorization and appropriation of funds. The Secretary's office includes the Principal Deputy Assistant Secretary of the Army (Civil Works), the Deputy Assistant Secretary of the Army (Policy and Legislation), the Deputy Assistant Secretary of the Army (Project Planning and Review), the Deputy Assistant Secretary of the Army (Management and Budget), and their staffs who would participate in policy determinations and reviews, and other activities related to Louisiana coastal restoration.

4.3.6 Regional Working Group

The RWG would support the Task Force and facilitate regional level collaboration and coordination with the LCA Program Management Team and with all Federal and state agencies involved in ecosystem restoration. The RWG membership mirrors the composition of the Task Force, but at the regional level.

The RWG would:

- Advise the Program Management Team;
- Identify opportunities for leveraging agency resources to support the S&T Program; and
- Coordinate with other on-going ecosystem restoration actions, such as CWPPRA and State Wetlands Authority projects.

4.3.7 Science and Technology Office

The S&T Office is the focal point for activities of the S&T Program. It provides a physical location and single point of contact for all agencies and individuals with interests in science and technology. It must communicate regularly and efficiently with the LCA Program Management and the Program Execution Team while maintaining a separate identity and independence from the day-to-day activities of implementation. While addressing the scientific needs of the LCA Program, the S&T Program would also strive to meet the technical needs of participating agencies within the context of their participation in the LCA Program. The S&T Office must also be responsive to the technical needs of the Program Execution Team and provide analytical tools responsive to the team (e.g., hydrodynamic and ecological models) and frequently assess the effectiveness of those tools through close communication. Funds would be allocated to the Science Program by the Program Manager to address science needs in support of the goals and objectives of the LCA Program. For example, funds could be used to: 1) develop necessary scientific data and information to implement features found in the LCA Plan; and 2) fund coastal restoration science and technology proposals to address uncertainties related to enhancing system-wide understanding, engineering concepts, and operational methods. Ongoing modeling efforts would continue as an integral component of the S&T Program to address uncertainties and assist in the implementation of the LCA Plan. The main structural elements of the LCA S&T Program and its relationship to program management are shown in **figure MR 4-6**.

The Director oversees the S&T Program, and is responsible for the operation and the conduct of all functions of the S&T Program. The Director is a member of the Program Management Team. Program budget requests are prepared by the Director in coordination with the Program Execution Team request and submitted to the Program Manager. A copy of the S&T budget request would also be provided to the Program Execution Team for consistency in submission of the program budget request to the Program Manager. The Director is a Federal employee under the S&T Office and should meet the qualifications set by the Program Manager. More specifically, the Director should have:

- Experience in managing complex interdisciplinary scientific programs,
- Undertaken substantial scientific research work in any field related to LCA,
- Experience managing environmental issues or advising high-level managers in methods for promoting science-based decision making, and
- A record of publication in the peer reviewed scientific literature.

Decision support describes the framework and process used to integrate analysis with decision-making, and represents the primary purpose of the S&T Program. The Program seeks to help decision makers to make the best possible decisions about the design and implementation of LCA Plan projects in the face of uncertainty, and to reduce uncertainty over time in order to improve future project planning and decision-making. The challenge for the S&T Program is to develop a decision support framework that incorporates scientific approaches directly into the LCA Plan planning and implementation process.

Within the S&T Program, the system synthesis model would be used to help identify and prioritize key scientific uncertainties and to select and configure demonstration projects and experiments to help reduce these uncertainties over time, following the principles of AEAM. In turn, the systems synthesis modeling team must have a clear process and capability to use what is learned in order to make model improvements over time.

The model would also take into account sensitivity analyses and assessments of uncertainties in data or relationships of variables. A systematic evaluation of these considerations would be included in the model framework. Where uncertainties and model performance issues cannot be addressed by collection of additional data or model testing, best professional judgment and data from published literature would be used in the model.

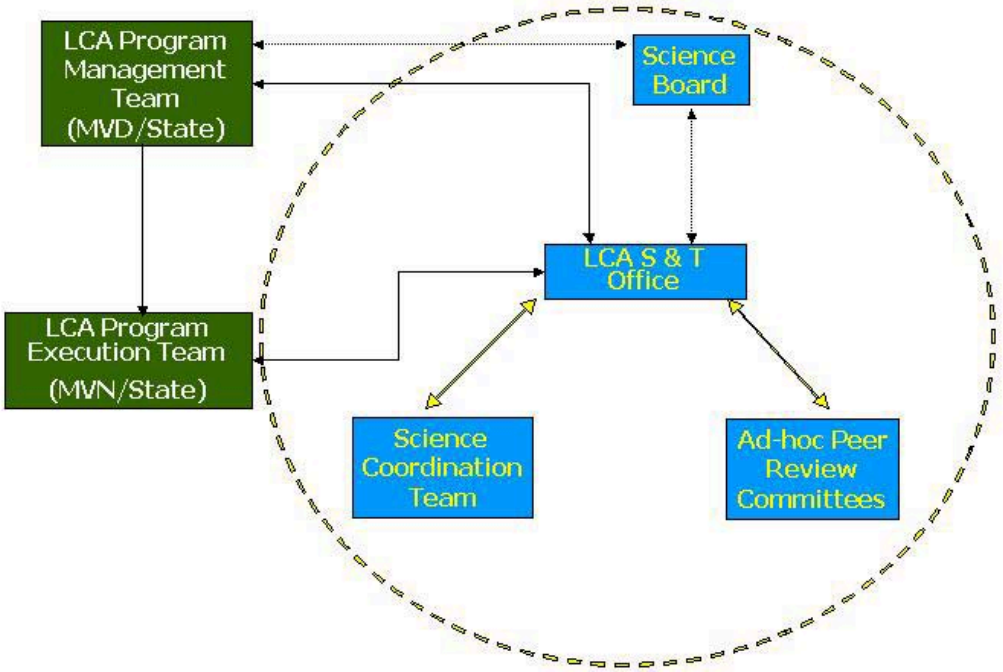

Figure MR 4-6. Relationship of the S&T Program with LCA Program Management and the Program Execution Team.

4.3.7.1 Science Board (SB)

The Science Board (SB) would be a small group that would meet periodically and would be knowledgeable of the ongoing activities of the program. The SB would consist of the appropriate number of members depending on scope of particular review, including:

- Several National Academy of Science-level academics (convened on a contract basis)
- A representative of the Corps of Engineers (Federal lead agency)

- A representative of the State of Louisiana (non-Federal lead)
- A representative of appropriate additional Federal agencies

Each member of the SB would have appropriate scientific credentials in an appropriate field of science or engineering and have experience in the science and technology issues surrounding coastal restoration.

The role of the SB would be to periodically review the S&T Program as well as the overall LCA Program, as it relates to use of science and technology, and prepare reports that provide recommendations and advice to the Program Management Team and the LCA S&T Office. The purpose of these reviews and reports would be to provide an independent assessment of the program. The Director of the S&T Office would keep regular communication with the SB between formal review sessions. Additionally, the SB would:

Review the LCA program to identify gaps in scientific information and AEAM tools and strategies,

- Recommend tools, processes, and methodologies from a review of current research to improve ongoing LCA restoration efforts,
- Work closely with the Director to review recommended changes that are needed in the applied science strategies of the restoration program,
- Possibly recommend establishing new science initiatives, innovative restoration tools, and other challenging research and development issues, and
- Report to Program Management and the Director of the S&T Office regarding the effectiveness of the S&T Program to meet the science and information needs of the restoration program.
- Provide recommendations to better incorporate the output of the S&T Program into the overall LCA Program.
- Provide reviews of how effectively the PMT is incorporating the output of the S&T Program and the recommendations of the SB into the overall LCA Program, and make recommendations to improve use of S&T Program results.

4.3.7.2 Science Coordination Team (SCT)

The SCT would provide the S&T Program with a mechanism for coordinating LCA Plan science initiatives with ongoing and planned work being undertaken in state and Federal agencies, other restoration efforts, and within the broader scientific community. An inventory of ongoing Federal and state agencies and academic institutions was initiated in 2004 to expedite this effort. The SCT members would assist with information transfer efforts, planning periodic science symposia, and would advise the S&T Office of new scientific developments and technological advances occurring within their agencies. The SCT would be an inclusive body with members representing Federal, state and local governmental agencies with scientific interests, NGOs, academic institutions, and private interests. The S&T Director would chair the SCT.

4.3.7.3 Ad hoc peer review committees

All scientific investigations and project studies would be subject to a peer review by an independent panel of experts as determined by the S&T Director. A panel of experts shall be composed of independent experts who represent a balance of areas of expertise suitable for the review being conducted. The peer review could include a review of the economic and environmental assumptions and projections, project evaluation data, economic analyses, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, models used in evaluation of economic or environmental impacts of proposed projects, and any other work products of the project study.

4.4 CONSISTENCY AND COORDINATION BETWEEN DEVELOPMENT AND COASTAL RESTORATION AND PROTECTION EFFORTS

4.4.1 Consistency Between Coastal Restoration and Other Coastal Activities

From navigation improvements and hurricane protection to residential and commercial construction, development activities can affect the Louisiana coastal environment. Yet, such activities are critical for a healthy and vibrant economy in coastal Louisiana. The challenge, therefore, is to ensure that economic development does not undermine the sustainability of wetlands and coastal ecosystems that are also vital to long-term economic health of the region and Nation. The solution is neither a moratorium on growth in the coastal zone, nor "business as usual."

Project purposes such as hurricane protection, navigation, and economic development must be addressed in a way that is consistent with coastal restoration and protection efforts. Indeed, Section 303(d) of CWPPRA mandates consistency for some important activities:

> *Consistency--- (1) In implementing, maintaining, modifying, or rehabilitating navigation, flood control or irrigation projects, other than emergency actions, under other authorities, the Secretary* [of the Army]*, in consultation with the Director* [of the USFWS] *and the Administrator* [of the EPA]*, shall ensure that such actions are consistent with the purposes of the restoration plan submitted pursuant to this section.*

Despite efforts to address this important provision, it is acknowledged by many stakeholders that a more thorough and comprehensive effort is needed to ensure consistency across the coast. It is further recognized that the LCA Plan is the appropriate vehicle for initiating such an effort. In order to move towards such consistency, implementation of the LCA Plan would include:

- "Coastal Consistency" reviews by the LCA Program Execution Team of all District feasibility reports and significant regulatory actions;

- Early coordination between both the state and District on all projects in the Coastal Area that have potential impacts upon restoration activities;
- Adherence to the Coastal Zone Management Act Federal Consistency Regulations (15 CFR Part 930 Subpart C---Consistency for Federal Agency Activities, 16 U.S.C. 1451 et seq.)

These efforts to enhance internal and external coordination would build upon the significant progress that has already been made as a result of the formation of the interagency (Federal and state) collocated restoration team housed within the District. In implementing the LCA Plan, the state would also work towards consistency with their Coastal Zone Management Plan. A more detailed Consistency Action Plan is included in chapter 6 of the LCA FPEIS. The **figure MR 4-7** indicates the coordination that would be necessary to achieve coastal consistency. Most of these state and Federal programs involving coastal management are under the purview of the agencies represented on the Task Force.

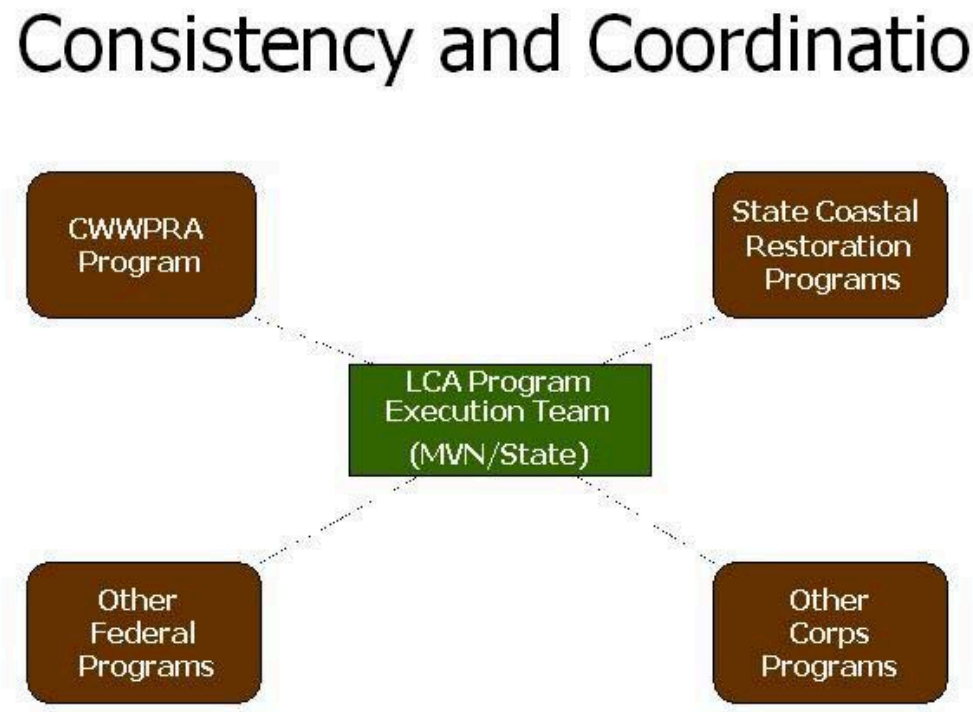

Figure MR 4-7. Consistency and Coordination.

4.4.2 Federal Agency Coordination

The U.S. Fish and Wildlife Service in their programmatic Fish and Wildlife Coordination Act Report (FWCAR) for the LCA Ecosystem Restoration Study has indicated concurrence with the findings of the study. The FWCAR recommendations state – "Given the substantial adverse future impacts to coastal wetlands and their associated fish and wildlife resources that are expected to occur under future without-project conditions, the USFWS strongly supports authorization and implementation of the TSP (LCA Plan) as it would provide the greatest level of sustainable benefits to Louisiana's Nationally significant coastal fish and wildlife resources." The Fish and Wildlife Coordination Act Report (FWCAR) is included as Appendix B6 to the FPEIS.

The reports In the September 17, 2004, Federal Register (volume 69, number 180), the U.S. Environmental Protection Agency rated the LCA Draft PEIS as LO - Lack of Objections. In addition the USEPA had no objections to the selection of the Tentatively Selected Plan (LCA Plan) of Action, and fully supported the primary restoration strategies.

The FWCAR also contained several recommendations for coordination and planning consistency under the LCA Plan. These recommendations are:

1. *In accordance with the January 2003 Partnership Agreement for Water Resources and Fish and Wildlife between the Service and the Corps, sufficient continuous funding should be provided to the Service to fulfill our responsibilities under Section 2(b) of the Fish and Wildlife Coordination Act throughout post-authorization engineering and design studies for demonstration projects, participation in the Science and Technology Program, Near-Term Plan (NTP) projects, and planning and evaluation for long-term project feasibility studies. To facilitate that level of cooperation, the Service intends to negotiate an LCA-specific Memorandum of Agreement with the Corps (similar to that used for Florida's Everglades Restoration study) soon after the NTP is authorized.*

In accordance with the January 2003 Partnership Agreement for Water Resources and Fish and Wildlife between the USFWS and the USACE, the District would continue to provide funding required by the USFWS to enable their full participation throughout future detailed planning and post-authorization engineering and design studies, and to fulfill their reporting responsibilities for the LCA Plan component features under Section 2(b) of the Fish and Wildlife Coordination Act. Additionally, the District in cooperation with the USFWS, Lafayette Field Office, would draft and execute an LCA-specific Memorandum of Agreement detailing the operating guidelines for negotiating transfer funds (similar to those used for the Comprehensive Everglades Restoration Plan) and to facilitate and expedite the USFWS future involvement.

2. *Under provisions of Section 7 of the ESA of 1973, as amended, the Service will also assist the Corps and any other Federal agencies responsible for funding or implementing selected projects and/or plans to ensure that they will neither jeopardize the continued existence of threatened and endangered species, nor adversely modify any designated critical habitat. The required consultations will be accomplished on a project-by-project basis, and will tier from the current programmatic consultation, details of which are*

contained in the Programmatic Environmental Impact Statement (PEIS) for the NTP. In keeping with the consultation requirements of the ESA, informal and formal (if needed) consultation must be completed before the Record of Decision for the NTP and PEIS can be signed. The Service (via the Department of the Interior's August 2004 letter) has concurred with the Corps' determination that the TSP is not likely to adversely effect any currently listed threatened or endangered species or designated critical habitat for which the Service has consultative jurisdiction.

Under provisions of the ESA, the District would continue to accomplish the required consultations on a project-by-project basis, and would tier from the current programmatic consultation, details of which are contained in the FPEIS for the LCA Plan. Further, in keeping with the consultation requirements of the ESA, informal and formal (if needed) consultation would be completed before the Record of Decision for the LCA Plan and PEIS can be signed.

3. *The Corps should coordinate closely with individual refuge managers prior to conducting any work on a National Wildlife Refuge, in conformance with the National Wildlife Refuge System Improvement Act of 1997. Such coordination will be essential to the timely completion of the Service's determination that the proposed work will/will not be compatible with the purposes for which those refuges were established, and to secure any appropriate permits that may be required. Likewise, LCA activities occurring on State-administered Wildlife Management Areas or refuges should also be fully coordinated with the Louisiana Department of Wildlife and Fisheries.*

Under provisions of the National Wildlife Refuge System Improvement Act of 1997, prior to initiating implementation of an LCA Project that would potentially affect any NWR, the District would, contact the appropriate Refuge Manager to determine if the proposed project constitutes a "refuge use" subject to a compatibility determination. If required to determine the anticipated impacts of any proposed use, the District would provide sufficient data and information to document any short-term, long-term, direct, indirect, or cumulative impacts on NWR resources. Compatibility determinations would include a public review and comment period before issuance of a final decision by the Service. To facilitate such contacts, the Louisiana Field Office would be contacted at (337) 291-3100. Likewise, the District would fully coordinate with the LDWF for those LCA Plan activities occurring on state-administered Wildlife Management Areas or refuges.

4. *Because of the uncertainties regarding some of the currently proposed habitat prediction methodologies, and because many details regarding the design, operation, and associated effects of the TSP are not yet available at the current programmatic level of planning, the USFWS cannot complete their evaluation of the individual TSP features' effects on fish and wildlife resources, nor can they entirely fulfill their reporting responsibilities under Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) for each of those features. Therefore, extensive additional Service involvement during subsequent detailed planning, engineering, design, and construction of specific project measures, along with more-definitive project information that will be available during those planning phases, will be required so that we can fulfill our responsibilities under that Act. Additionally, improvements in the*

hydrologic and desktop models will be needed to predict environmental impacts and benefits of individual plan features, as indicated in our previous draft Fish and Wildlife Coordination Act Reports (Paille and Roy 2003, Grouchy and Paille 2004). Additionally, the USFWS states that the proposed Science and Technology Program should give high priority to refining the land gain/loss and habitat change models to enable determination of and evaluation of project-level effects and facilitate completion of FWCA reporting.

The District intends to maintain the integrity of the collocated team which would afford the USFWS the ability to be intensively involved during subsequent detailed planning, engineering, design, and construction of specific LCA Plan restoration features, and provide more-definitive project information that would be available during those planning phases, in an effort to provide sufficient information to the USFWS to fulfill their responsibilities under Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq). Additionally, the LCA S&T Program would give high priority to improvements in the hydrologic and desktop models that would better enable prediction of potential environmental impacts and benefits of individual plan features and the program manager would ensure that the S&T Office resolves any outstanding issue, or concerns regarding models or evaluation process in cooperation with the participating agency (including USFWS).

5. *The USFWS has actively participated throughout the formulation and evaluation of the LCA coastwide alternatives and the selection of near-term restoration features, the large-scale studies, and the potential demonstration projects that comprise the TSP. USFWS involvement and input includes the preparation of three previous draft Fish and Wildlife Coordination Act Reports (Paille and Roy 2003a, and 2003b, and Grouchy and Paille 2004); a letter listing threatened and endangered species within coastal parishes (Appendix A of the FWCAR); assistance in preparation of the draft Biological Assessment for Comprehensive Plan effects on threatened and endangered species; a May 11, 2004, letter affirming our continued participation as a Cooperating Agency in accordance with the implementing regulations of the National Environmental Policy Act of 1969; and concurrence with the District's programmatic "not likely to adversely affect" threatened and endangered species determinations (via an August 23, 2004, Department of the Interior letter). Those documents are incorporated into the FWCAR by reference, and should be considered as integral components of the administrative record for the forthcoming final PEIS and LCA Study Report.*

Under provisions of the NEPA, ESA, and the Fish and Wildlife Coordination Act, and because they are integral components of the administrative record, the District has included (in Appendix B of the FPEIS) the three previous draft FWCAR (Paille and Roy 2003a, and 2003b, and Grouchy and Paille 2004); the letter listing threatened and endangered species within coastal parishes (Appendix A of the FWCAR); the draft Programmatic Biological Assessment for the Comprehensive Plan effects on threatened and endangered species; the May 11, 2004, letter affirming the USFWS continued participation as a Cooperating Agency; the August 23, 2004, Department of the Interior letter of concurrence with the District's programmatic "not likely to adversely affect" threatened and endangered species determinations; and the October 6, 2004,

FWCAR in appendix B6 of the FPEIS as integral components of the administrative record for the forthcoming FPEIS and LCA Main Report.

6. *For purposes of maximizing synergistic wetland restoration benefits within the eastern Terrebonne Basin critical needs area, the post-authorization studies for the proposed Small Bayou Lafourche Diversion Project should, to the maximum extent possible, incorporate key Grand Bayou-area features of the Convey Atchafalaya River Water to Northern Terrebonne Basin Project.*

The District, working with other Federal and non-Federal agencies, would evaluate the synergistic effects of the LCA Plan's features as well as the synergistic effects of those features with other actions or projects during the specific feasibility level evaluation and make adjustments to project implementation accordingly.

The following Federal agencies are formal Cooperating Agencies for the LCA Study: MMS, NRCS, NMFS, USEPA, USFWS, and the USGS. The technical input from these agencies has greatly contributed to the completeness, effectiveness, and efficiency of the study. Continued cooperation and collaboration would greatly assist in effective plan implementation as well. With the exception of the Science Director, the S&T Office would be staffed in accordance with the level of effort and required tasks. It is probable that Federal and state agency scientists would be members of these teams on a case-by-case basis.

4.4.3 CWPPRA Task Force

As the lead decision maker for coastal projects pursued under CWPPRA, the CWPPRA Task Force would interact with the LCA Task Force. Primary interaction would be to ensure that efforts pursued under CWPPRA are complementary to efforts pursued under LCA. This interaction would include:

- CWPPRA Task Force members would be briefed on Task Force actions through their respective agency's chain of command;
- Attendance at Task Force quarterly meetings, as necessary; and
- Attendance at Governor's Advisory Commission meetings, as necessary.

Some of the features identified in the LCA Study as having the potential to address areas of critical ecological need already have some level of investigation and design effort completed under CWPPRA. Approval of the LCA Plan, especially the programmatically and conditionally authorized elements, would present an opportunity to expeditiously move towards implementation of some of these features that would take longer if they proceeded under the funding-constrained CWPPRA program. This would enable CWPPRA to potentially refocus or prioritize its program elements towards other important restoration efforts that complement LCA program elements. The CWPPRA features would continue to provide restoration benefits, as well as lessons learned to the larger-scale and longer-term restoration efforts undertaken within the Louisiana coastal area.

4.4.4 State of Louisiana Coastal Restoration Program Efforts

4.4.4.1 Louisiana Wetlands Conservation and Restoration Authority

The Louisiana Wetlands Conservation and Restoration Authority (State Wetlands Authority or Authority) is a cabinet level body legislatively established in 1989 (R.S. 49:213.1 et seq) within the Office of the Governor. Its functions include promulgation of policy with respect to coastal restoration, development of an annual coastal plan subject to the approval of the Louisiana legislature, and approval of funds proposed for appropriation from the Wetlands Conservation and Restoration Fund.

The Governor's appointed Executive Assistant for Coastal Activities serves as Chair of the Authority to develop procedures for the operation of the Authority, and to perform any tasks delegated to him by the Authority. The State Wetlands Authority is composed of the Governor's Executive Assistant for Coastal Activities, the director of the State Soil and Water Conservation Committee, the Commissioner of Administration and the Secretaries of the Departments of Natural Resources, Wildlife and Fisheries (LDWF), Environmental Quality (LDEQ), and Transportation and Development (LDOTD).

The Authority must approve any request by any state agency for funds to finance research, programs or projects involving coastal wetlands, except those to be funded from self-generating sources. Acting for the Authority, the Executive Assistant is responsible for overseeing and coordinating "all state departmental budget requests for programs and projects pertaining to coastal wetlands conservation and restoration, as well as all requests for funds to be appropriated from the Wetlands Conservation and Restoration Fund." Furthermore, the roles of the Executive Assistant include "review and reconcile state agency comments on federally sponsored water resource development projects" and "represent the policy and consensus viewpoint of the state at the Federal, regional, state and local levels with respect to wetlands conservation and restoration," and is expected to "report annually to the legislative committees on natural resources as to the progress of the projects and programs enumerated in the plan," providing such details as "estimated construction and maintenance costs, progress reports, and estimated completion timetables" (R.S. 49:213.1 et seq).

4.4.4.2 Louisiana Governor's Advisory Commission on Coastal Restoration and Conservation

Created within the Office of the Governor in the public interest, the Advisory Commission on Coastal Restoration and Conservation (the Commission) acts to advise the Governor of Louisiana and the Executive Assistant for Coastal Activities on coastal issues relative to the overall status and direction of the state's restoration program. The Governor's Office of Coastal Activities provides staffing functions for the Commission.

A broad range of groups and stakeholders comprise the 31-member Commission, representing numerous and diverse interests that live, work, and recreate in coastal Louisiana. Leaders in finance, banking and business, agriculture and farming, academia, non-governmental

organizations and the conservation community, energy production and distribution, industry, political subdivisions, landowners, legislators, and commercial and recreational fishing are all represented on the Commission.

Commission meetings provide a forum for coordinating activities and exchanging information on the status of various state and Federal efforts affecting coastal preservation and conservation, fostering collaboration between various stakeholder groups and involved state and Federal agencies, identifying and resolving conflicts, and identifying potential sources of funding for coastal projects and programs.

4.5 ADAPTIVE ENVIRONMENTAL ASSESSMENT AND MANAGEMENT

As detailed in section 2.2 EXISTING AND FUTURE WITHOUT-PROJECT CONDITIONS, large coastal ecosystems like the Louisiana coastal area are dynamic systems that integrate terrestrial and marine processes nested in scale from global to local influences against a backdrop of historical conditions. The scientific and technological uncertainties outlined in section 3.1 PLANNING CONSTRAINTS, as well as watershed influences that affect delivery of water, sediment, and nutrients, and uncertainty in the timing and magnitude of infrequent, but high-energy events such as floods and storms, storms make response prediction within these large ecosystems inherently difficult. Integration of an AEAM system within the LCA Program would facilitate management of this complex system to best meet the planning objectives.

AEAM prescribes a management process wherein future actions can be changed as the efficacy of past actions on the ecosystem is determined through monitoring and other means to improve knowledge about the response of the system (Holling and Gunderson 2002). The AEAM approach recognizes that uncertainty is unavoidable in managing large-scale ecological systems. If properly planned and maintained, the feedback element can be used to sequentially improve management actions so that future system conditions become more consistent with program goals and objectives than past actions. AEAM allows development of an iterative and flexible approach to management and decision-making.

All organizations within the LCA Management Structure have a role in implementing AEAM. The LCA S&T Office would make AEAM recommendations to the Program Management Team and the PET based on assessment of monitoring data and the development of new tools or technologies. Specifically, the Program Manager is responsible for the overall program and issuing programmatic guidance to make necessary adjustments to better meet program objectives. The PET would implement changes directed by the programmatic guidance. **Figure MR 4-8** depicts this iterative process and the roles of the different groups. It is important to note that the scope of decisions presented in the "decision process" in **figure MR 4-8** would differ in scale. One way of expressing this is to distinguish between strategic decisions and tactical decisions. Strategic decisions comprise the decisions about the nature and timing of large projects and major policies related to the overall programmatic effort. Tactical decisions comprise those decisions about implementation and operation that are necessary for the projects and policies to succeed. The AEAM framework applies to both strategic and tactical decisions

about coastal restoration. The key attribute of the decision process under AEAM is well-defined and effective communication. The AEAM within the LCA Program management would build upon lessons learned over the past several years in CWPPRA, along with CWPPRA-initiated tool development, such as the Coast-wide Reference Monitoring System (Steyer et al. 2003).

The structures and general process outlined in the LCA S&T Program provide the basic elements of an AEAM program. To make the AEAM effort most effective, it would be important to view the restoration effort as a learning process, with adaptation as required. Timely and effective communication of information to all participants would be instrumental in effectively implementing the AEAM process and to further attain program objectives. Examples of communication tools are project-specific assessment reports (report cards), annual programmatic AEAM report, and science symposia convened on an annual or biennial basis. Appendix A SCIENCE AND TECHNOLOGY PROGRAM expands on this general discussion of AEAM.

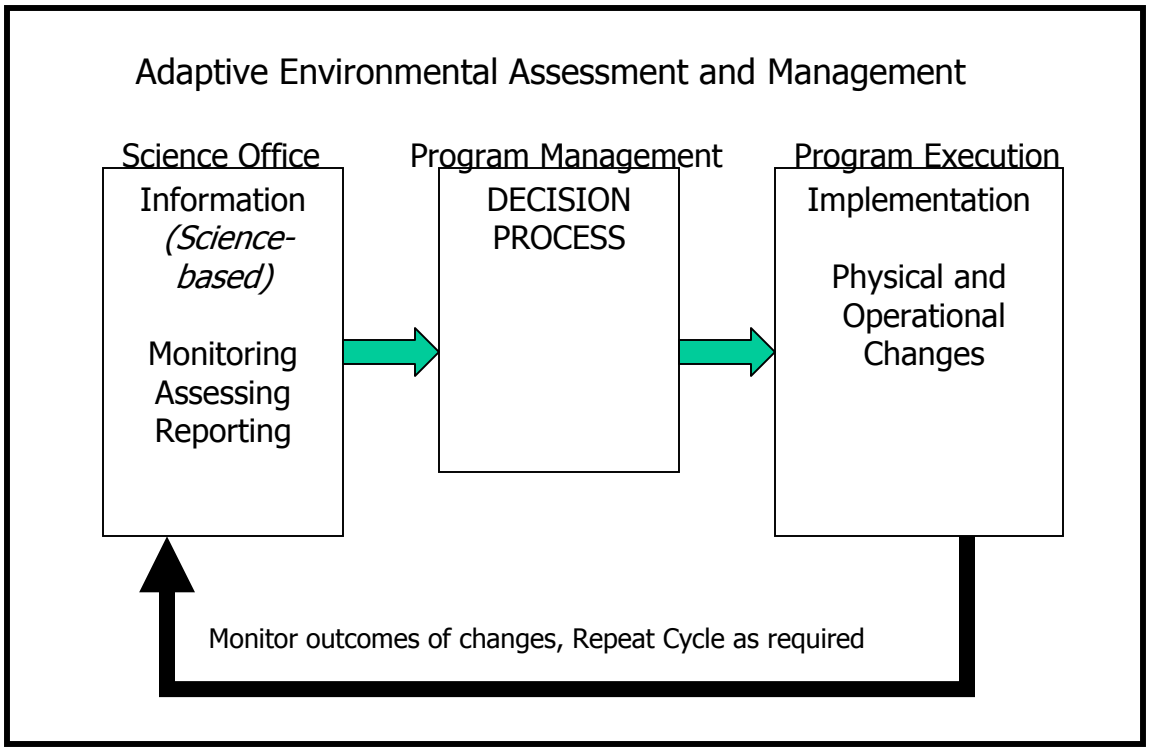

Figure MR 4-8. Adaptive Environmental Assessment and Management Process.

4.6 INSTITUTIONAL REQUIREMENTS

The WRDA of 1986 comprehensively reestablished and redefined the Federal interest in water resources development and, in recognition of the limitations on Federal financial resources, instituted requirements for proportionately greater non-Federal cost-sharing in USACE projects.

4.7 DIVISION OF RESPONSIBILITIES

4.7.1 Non-Federal Sponsor

The non-Federal sponsor is the State of Louisiana, acting through its LDNR. The LDNR would sponsor further planning studies, preparation of comprehensive plans and specifications developed during the detailed preconstruction engineering and design phase, and implementation of authorized projects under the LCA Program. The non-Federal sponsor has been made aware of and has expressed a complete understanding of the ultimate requirements for plan implementation.

4.7.2 Cost Sharing Requirements

The plan recommended in the report would require non-Federal cost-sharing for implementation. A standard cost share percentage of 65 percent Federal and 35 percent non-Federal would be applied for construction features, including demonstration projects and the S&T Plan, 75 percent Federal and 25 percent non-Federal would be applied for beneficial use of dredged material, 50 percent Federal and 50 percent non-Federal for general investigations, studies, and feasibility-level decision documents, and 100 percent of land, easements, rights of way, relocations, and disposals (LERRDs) and operations, maintenance, repair, rehabilitation, and replacement (OMRR&R) costs would be the responsibility of the non-Federal sponsor. These implementation costs are shown in summary and in detail in **tables MR 4-18** and **MR 4-19**, respectively.

As shown, the total cost consists of four major elements. The general investigations (GI) costs are those associated with preparation of the feasibility-level decision document. The PED phase is the phase during which the project design is finalized, plans and specifications are completed, and the construction contract is prepared for award. The construction cost includes all costs associated with project construction, as well as costs for monitoring and adaptive management. Operation and maintenance costs are those associated with operating and maintaining a project; this category includes costs of induced dredging.

4.7.3 Federal Obligations

1. Subject to receiving funds appropriated by the Congress of the United States and using those funds and funds provided by the non-Federal sponsor, expeditiously constructing the Project, applying those procedures usually applied to Federal projects, pursuant to Federal laws, regulations, and policies.

2. Affording the non-Federal sponsor the opportunity to review and comment on the solicitations for all contracts, including relevant plans and specifications, prior to the Government's issuance of such solicitations. The Government shall consider in good faith the comments of the non-Federal sponsor, but the contents of solicitations and award of contracts shall be exclusively within the control of the Government.

3. To the extent possible, affording the non-Federal sponsor the opportunity to review and comment on all contract modifications, including change orders, prior to the issuance to

the contractor of a Notice to Proceed. In those cases where providing the non-Federal sponsor with notification of the contract modification or change order is not possible prior to issuance of the Notice to Proceed, such notification would be provided in writing after the fact at the earliest date possible. The Government shall consider in good faith the comments of the non-Federal sponsor, but the execution of contract modifications, and issuance of change orders, shall be exclusively within the control of the Government.

4. To the extent possible, affording the non-Federal sponsor the opportunity to review and comment on all contract claims prior to resolution thereof. The Government shall consider in good faith the comments of the non-Federal sponsor, but the resolution of contract claims, and performance of all work on the Project (whether the work is performed under contract or by Government personnel), shall be exclusively within the control of the Government.

5. Throughout the period of construction, furnishing the non-Federal sponsor with a copy of the Government's Written Notice of Acceptance of Completed Work for each contract for the Project.

6. After the Government determines that construction of the Project, or functional portion of the Project, is complete: 1) notifying the non-Federal sponsor in writing of such determination; 2) furnishing the non-Federal sponsor with an Operation, Maintenance, Repair, Replacement, and Rehabilitation Manual; and 3) turning the Project, or functional portion of the Project, over to the non-Federal sponsor for operation, maintenance, repair, replacement, and rehabilitation.

7. Performing a final accounting to determine the contributions provided by the non-Federal sponsor, and to determine whether the non-Federal sponsor has met its obligations.

Table MR-4-18. Summary of LCA Plan Federal and Non-Federal Cost Share Responsibilities (June 2004 Price Levels)

Conditionally Authorized Features:		
Feasibility-level Decision and NEPA Documentation Cost:		
Federal (50%)	$	27,336,500
Non-Federal (50%)	$	27,336,500
Subtotal	$	54,673,000
Construction Cost (Including PED, E&D, S&A, Monitoring):		
Federal (65%)	$	500,768,550
Non-Federal (35%):		
LERRD*	$	178,619,000
Cash	$	130,004,450
Subtotal	$	809,392,000
Total	**$**	**864,065,000**
*For the conditionally authorized feature, Small Diversion at Hope Canal, LERRD exceeded 35% of the total project cost by $25,336,250, which is reimbursed to the non-federal sponsor.		
Programmatically Authorized Features:		
Science & Technology Program (10 year program)		
Federal (65%)	$	65,000,000
Non-Federal (35%)	$	35,000,000
Demonstration Program (10 year program)		
Federal (65%)	$	65,000,000
Non-Federal (35%)	$	35,000,000
Beneficial Use of Dredge Material Program		
Federal (75%)	$	75,000,000
Non-Federal (25%)	$	25,000,000
Investigations of Modifications of Existing Structures		
Federal (50%)	$	5,000,000
Non-Federal (50%)	$	5,000,000
Total	**$**	**310,000,000**
Conventionally Authorized Features:		
Feasibility-level Decision and NEPA Documentation Cost:		
Federal (65%)	$	23,764,500
Non-Federal (35%)	$	23,764,500
Subtotal	$	47,529,000
Construction Cost (Including PED, E&D, S&A, Monitoring):		
Federal (65%)	$	464,351,550
Non-Federal (35%)		
LERRD	$	208,100,000
Cash	$	41,935,450
Subtotal	$	714,387,000
Total	**$**	**761,916,000**
Large-scale, Long-term Studies for Future Congressional Authorization:		
Federal (50%)	$	30,000,000
Non-Federal (50%)	$	30,000,000
Total	**$**	**60,000,000**

Table MR 4-19
Detailed LCA Plan Cost Sharing Distribution
(June 2004 Price Levels)

Item	Federal Share	Non-Fed Share	Total Cost
Feasibility-level Decision and NEPA Documentation - (50/50)	$ 27,336,500	$ 27,336,500	$ 54,673,000
Near-term Feature First Construction Cost - (65/35)	$ 402,750,300	$ 61,758,450	$ 489,845,000
Preconstruction, Engineering, and Design (PED) - (65/35)	$ 24,327,500	$ 11,924,500	$ 36,252,000
Engineering and Design (E&D) - (65/35)	$ 20,277,850	$ 8,740,150	$ 29,018,000
Supervision and Administration (S&A) - (65/35)	$ 48,859,750	$ 20,113,250	$ 68,973,000
Project Monitoring - (65/35)	$ 4,553,150	$ 2,131,850	$ 6,685,000
LERRD - (0/100)	$ -	$ 178,619,000	$ 178,619,000
Conditionally Authorized Subtotal	**$ 528,105,050**	**$ 310,623,700**	**$ 864,065,000**
Cash Contributions	*$ 555,225,300*	*$ 130,004,450*	
Science & Technology Program (10 year Program) - (65/35)	$ 65,000,000	$ 35,000,000	$ 100,000,000
Demonstration Program (10 year Program) - (65/35)	$ 65,000,000	$ 35,000,000	$ 100,000,000
Beneficial Use of Dredge Material Program - (75/25)	$ 75,000,000	$ 25,000,000	$ 100,000,000
Investigations of Modifications of Existing Structures - (50/50)	$ 5,000,000	$ 5,000,000	$ 10,000,000
Programmatically Authorized Subtotal	**$ 210,000,000**	**$ 100,000,000**	**$ 310,000,000**
Cash Contributions	*$ 210,000,000*	*$ 100,000,000*	
Total Conditionally/Programmatically Authorized Subtotal	**$ 738,105,050**	**$ 410,623,700**	**$ 1,174,065,000**
Feasibility-level Decision and NEPA Documentation - (50/50)	$ 23,764,500	$ 23,764,500	$ 47,529,000
Near-term Feature First Construction Cost - (65/35)	$ 334,439,850	$ 25,829,150	$ 360,269,000
Preconstruction, Engineering, and Design (PED) - (65/35)	$ 31,417,550	$ 4,609,450	$ 36,027,000
Engineering and Design (E&D) - (65/35)	$ 40,662,750	$ 4,972,250	$ 45,635,000
Supervision and Administration (S&A) - (65/35)	$ 54,137,450	$ 4,535,550	$ 58,673,000
Project Monitoring - (65/35)	$ 3,693,950	$ 1,989,050	$ 5,683,000
LERRD - (0/100)	$ -	$ 208,100,000	$ 208,100,000
Conventionally Authorized Features Subtotal	**$ 488,116,050**	**$ 273,799,950**	**$ 761,916,000**
Cash Contributions	*$ 488,116,050*	*$ 65,699,950*	
Large-scale Studies - (50/50)	$ 30,000,000	$ 30,000,000	$ 60,000,000
Total Conventionally Authorized Subtotal	**$ 518,116,050**	**$ 303,799,950**	**$ 821,916,000**
Total LCA Plan Cost Share	**$ 1,256,221,100**	**$ 714,423,650**	**$ 1,995,981,000**
Total Cash Contributions	*$ 1,283,341,350*	*$ 325,704,400*	
Total Real Estate		$ 386,719,000	

*For the conditionally authorized feature, Small Diversion at Hope Canal, LERRD exceeded 35% of the total project cost by $25,336,250, which is reimbursed to the non-Federal sponsor.

4.7.4 Non-Federal Responsibilities

The non-Federal sponsor shall, prior to implementation, agree to perform all of the local cooperation requirements and non-Federal obligations. Local cooperation requirements and non-Federal sponsor obligations include, but are not necessarily limited to:

1. Provide a minimum of 50 percent of costs allocated to general investigations, studies, and feasibility-level decision documents.

2. Provide a minimum of 35 percent of total project costs allocated to ecosystem restoration/environmental protection project costs, including demonstration projects, a minimum of 25 percent of total project costs allocated to beneficial use of dredged material:

    a. Enter into an agreement which provides, prior to execution of the project cooperation agreement, 25 percent of design costs;

    b. Provide, during the first year of construction, any additional funds needed to cover the non-Federal share of design costs;

    c. Provide all lands, easements, and rights-of-way, including suitable borrow and dredged or excavated material disposal areas, and perform or assure the performance of all relocations determined by the Federal Government, in consultation with the non-Federal sponsor, to be necessary for the construction, operation, maintenance, repair, replacement, and rehabilitation of the project;

    d. Provide or pay to the Federal Government any additional funds needed to cover the cost of providing all retaining dikes, waste weirs, bulkheads, and embankments, including all monitoring features and stilling basins, that may be required at any dredged or excavated material disposal areas required for the construction, operation, maintenance, repair, replacement, and rehabilitation of the project;

    e. Provide, during construction, any additional funds necessary to make its total contribution attributable to ecosystem restoration/environmental protection equal to 35 percent of total project costs allocated to ecosystem restoration/environmental protection, and 25 percent of the total project costs allocated to beneficial use of dredged material;

4. 3. Provide 35 percent of the costs allocated to the Science Program;

4. Provide the non-Federal share of that portion of the costs of mitigation and data recovery activities associated with historic preservation, that are in excess of 1 percent of the total amount authorized to be appropriated for the project;

5. Not use Federal funds to meet the non-Federal sponsor's share of total project costs unless the Federal granting agency verifies in writing that the expenditure of such funds is authorized;

6. Operate, maintain, repair, replace, and rehabilitate the project, or functional portion of the project, including mitigation, at no cost to the Federal Government, in a manner compatible with the project's authorized purposes and in accordance with applicable Federal and state laws and regulations and any specific directions prescribed by the Federal Government;

7. Give the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-Federal sponsor, now or hereafter, owns or controls for access to the project for the purpose of inspecting, operating, maintaining, repairing, replacing, rehabilitating, or completing the project. No completion, operation, maintenance, repair, replacement, or rehabilitation by the Federal Government shall relieve the non-Federal sponsor of responsibility to meet the non-Federal sponsor's obligations, or to preclude the Federal Government from pursuing any other remedy at law or equity to ensure faithful performance;

8. Hold and save the United States free from all damages arising from the construction, operation, maintenance, repair, replacement, and rehabilitation of the project and any project-related betterments, except for damages due to the fault or negligence of the United States or its contractors;

9. Perform, or cause to be performed, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Public Law 96-510, as amended (42 U.S.C. 9601-9675), that may exist in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be required for the initial construction, periodic nourishment, operation, and maintenance of the project. However, for lands that the Federal Government determines to be subject to the navigation servitude, only the Federal Government shall perform such investigations unless the Federal Government provides the non-Federal sponsor with prior specific written direction, in which case the non-Federal sponsor shall perform such investigations in accordance with such written direction;

10. Assume, as between the Federal Government and the non-Federal sponsor, complete financial responsibility for all necessary cleanup and response costs of any CERCLA regulated materials located in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be necessary for the initial construction, periodic nourishment, operation, or maintenance of the project;

11. Agree that, as between the Federal Government and the non-Federal sponsor, the non-Federal sponsor shall be considered the operator of the project for the purpose of CERCLA liability, and to the maximum extent practicable, operate, maintain, and repair the project in a manner that would not cause liability to arise under CERCLA;

12. Prevent obstructions of or encroachments on the project (including prescribing and enforcing regulations to prevent such obstruction or encroachments) which might reduce ecosystem restoration benefits, hinder operation and maintenance, or interfere with the project's proper function, such as any new developments on project lands or the addition of facilities which would degrade the benefits of the project;

13. Keep and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project, for a minimum of 3 years after completion of the accounting for which such books, records, documents, and other evidence is required, to the extent and in such detail as would properly reflect total costs of construction of the project, and in accordance with the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments at 32 Code of Federal Regulations (CFR) Section 33.20;

14. Comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended (42 U.S.C. 1962d-5), and Section 103 of the Water Resources Development Act of 1986, Public Law 99-662, as amended (33 U.S.C. 2213), which provides that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until the non-Federal sponsor has entered into a written agreement to furnish its required cooperation for the project or separable element;

15. Comply with all applicable Federal and state laws and regulations, including, but not limited to, Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d), and Department of Defense Directive 5500.11 issued pursuant thereto, as well as Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army," and all applicable Federal labor standards and requirements, including but not limited to 40 U.S.C. 3141- 3148 and 40 U.S.C. 3701 – 3708 (revising, codifying, and enacting without substantial change the provisions of the Davis-Bacon Act (formerly 40 U.S.C. 276a et seq.), the Contract Work Hours and Safety Standards Act (formerly 40 U.S.C. 327 et seq.) and the Copeland Anti-Kickback Act (formerly 40 U.S.C. 276c et seq.); and

16. Comply with all applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended (42 U.S.C. 4601-4655), and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way necessary for the initial construction, periodic nourishment, operation, and maintenance of the project, including those necessary for relocations, borrow materials, and dredged or excavated material disposal, and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act.

4.8 REAL ESTATE

The purpose of this section is to discuss the real estate issues involved in pursuing the LCA Plan described in this report.

4.8.1 Estates

The following estates are proposed to be acquired over real property, as appropriate for particular project features. Each feasibility report/decision document would more particularly propose the exact estates to be acquired. The brackets indicate optional language for rights that may need to be acquired, if necessary for a project feature.

4.8.1.1 Fee excluding minerals (with prohibition on use of the surface)

This estate would be acquired, as needed for fee title, e.g., structures, barrier islands, and shoreline protection. Public access would generally be allowed on fee-owned sites, except where prohibited due to safety or security concerns or otherwise inconsistent with project purposes. Shoreline projects would include the right of public use of the shoreline below the ordinary high water mark.

4.8.1.2 Flowage easement (permanent flooding)

This estate would be acquired to secure the perpetual right to permanently overflow, flood and submerge lands and may allow existing and new camps within flowage areas, e.g., outlying areas over which the only project impact would be the overflow of water, such as the outermost areas affected by freshwater diversion.

4.8.1.3 Channel or channel improvement easement

This estate allows the perpetual right to construct, operate, and maintain a channel or channel improvement work, e.g., channels for freshwater and/or sediment diversion, relocated navigation channels, and improvements to existing channels. Habitable structures would not be allowed to remain. Although mineral interests would be reserved to the owner, mineral exploration and extraction would not be allowed on the surface.

4.8.1.4 Wetland creation and restoration easement

This estate would be acquired to secure the perpetual right to construct, operate and maintain the creation and/or restoration of wetlands and associated coastal habitats on the land; the right to deposit dredged material sediment or other beneficial materials thereon; to construct dikes and to install, alter, relocate, repair or plug cuts in the banks of dikes; to accomplish any alterations of contours; to clear, trim, cut, fell, and remove therefrom any or all *[*trees, timber*]*, underbrush, obstructions and any other vegetation, structures, or obstacles as required; to clear, borrow, excavate and remove therefrom all soil, dirt and any other materials; to construct, operate and maintain pipelines; to place, move and utilize machinery; to plant or cause the growth of vegetation; provided that existing habitable structures may remain, but new habitable structures may not be constructed on the land; excepting and excluding from the taking all minerals, in and under said land and all appurtenant rights for the exploration, development, production and removal of said minerals, but exploration or drilling on the surface requires prior written approval. This estate would be acquired for marsh creation, and other restoration features.

For those areas currently in State of Louisiana ownership where land is anticipated to be created as a result of the deposition of inorganic material from a diversion project, the right of public access would be provided by the State of Louisiana. However, in such areas, public access would not be allowed until the land has been created and stabilized.

4.8.1.5 Flowage and deposition easement

This estate would be acquired to secure the perpetual right to overflow, flood and submerge the land, including the right to deposit dredged or sediment material on, over and across the land; the right to clear and remove any brush, debris and natural obstructions; provided that existing habitable structures may be maintained on the land, and new structures may be constructed as long as they are consistent with the construction, operation and maintenance of the authorized project, provided prior written approval is obtained; excepting and excluding from the taking all minerals, in and under said land and all appurtenant rights for the exploration, development, production and removal of said minerals, but exploration or drilling on the surface requires prior written approval. This estate would be acquired in areas over which there may be overflow of water and deposition of sediment, e.g., ponding areas resulting from diversions of freshwater or sediment and /or placing gaps in canals.

4.8.1.6 Dredged material pipeline easement

This easement is a temporary and assignable easement and right-of-way in, on, over and across the land for the location, construction, operation, maintenance, alteration, repair and patrol of an [underground] [above ground] dredged material pipeline. This estate would be acquired if a pipeline would be used for the transport of dredged material.

4.8.1.7 Dredged material disposal easement

This easement allows perpetual rights to construct, operate, and maintain a dredged material disposal area on the land, [including the right to construct dikes]; to deposit dredged material thereon; [to accomplish any alterations of contours on said land for the purpose of accommodating the deposit of dredged material as necessary in connection with such works]; [to borrow, excavate and remove soil, dirt and other materials, including dredged material, from said land;] [to undertake any management practice designed to enhance use of or extend the life of said land for the deposit of dredged material]; to clear, cut, fell and remove any and all trees, timber, underbrush or other obstructions; provided that existing habitable structures may be maintained on the land, and new structures may be constructed as long as they are consistent with the construction, operation and maintenance of the project, provided prior written approval is obtained; excepting and excluding from the taking all minerals, in and under said land and all appurtenant rights for the exploration, development, production and removal of said minerals, but exploration or drilling on the surface must be consistent with the construction, operation and maintenance of the authorized project and requires prior written approval. This estate would be acquired for the disposal of dredged material and would allow management practices.

4.8.1.8 Dike (and/or weir) easement

This easement allows perpetual and exclusive right to construct, maintain, repair, operate, patrol and replace [an earthen] [a stone] dike and/or weir; provided that no habitable structures shall be constructed or maintained on the land; excepting and excluding from the taking all minerals, in and under said land and all appurtenant rights for the exploration, development, production and removal of said minerals, but without the right to enter upon or over the surface of said land for the purpose of drilling and extracting therefrom said minerals.

4.8.1.9 Levee and channel easement

This easement combines two estates and would be acquired to secure the perpetual and assignable right to construct, maintain, repair, operate, patrol and replace a levee, rock weir, drainage ditch, channel and/or channel improvement works; provided that no habitable structures shall be constructed, existing structures may be maintained on the land, no other habitable structures shall be constructed or maintained on the land; excepting and excluding from the taking all minerals, in and under said land and all appurtenant rights for the exploration, development, production and removal of said minerals, but without the right to enter upon or over the surface of said land for the purpose of drilling and extracting therefrom said minerals.

4.8.1.10 Access easement

The estate would be acquired to ensure access to project features. In appropriate areas, the estate would expressly include the right of public access, e.g., access to the shoreline and navigational elements of a project.

4.8.1.11 Canal alteration easement

This estate would be acquired to secure the right to deposit materials within and around the canal, to place plugs or fully close the canal, to cut gaps in the canal, or make other alterations to a canal, in order to restore the hydrology and /or to stabilize the spoil banks along the canal. In appropriate areas, it may include the right to remove from the canal any plug in order to accommodate passage through the canal, provided the user replaces the plug thereafter. The estate would expressly provide that the original canal (or pipeline) easement or right of way is subordinate to the canal alteration easement.

4.8.2 Non-Federal Sponsor

The non-Federal sponsor is the LDNR, acting on behalf of the State of Louisiana. As the non-Federal Sponsor, the LDNR must provide all real estate interests required for each project implemented under the plan, i.e., all lands, easements, rights of way, relocations, and any other interests, including suitable borrow and dredged or excavated material disposal areas (LERRDs). LDNR has indicated it would provide all lands, water bodies, and/or waterbottoms that are owned, claimed, or controlled by the State of Louisiana, including the voluntary acquisition of oyster leases but has requested the District to acquire other real estate interests on its behalf, including condemning such interests if necessary. The LDNR also has requested that the District

perform all relocations and/or removals of public facilities and utilities, if required, except as said relocations and/or removals traverse State of Louisiana owned lands and/or water bottoms, in which the State of Louisiana would make every effort to resolve such actions.

The decision whether or not to acquire on behalf of a non-Federal sponsor is within the Government's discretion. Acquisition on behalf of the non-Federal sponsor would be discussed on a case-by-case basis in each decision document.

4.8.3 Non-Federal Sponsor-owned Real Property (LERRD's)

Given the time constraints for this report preparation, there was insufficient time for coordination with the Louisiana State Land Office to confirm State of Louisiana owned real property. For purposes of this report, the following position is adopted: the State of Louisiana is the owner of the bed and bottom of all waterways within the State that were navigable in fact, in 1812, when Louisiana was admitted to the United States. It is acknowledged that the State may have transferred ownership of certain water bodies to private interests. For planning purposes, it is assumed that the state owns the bed and bottoms of navigable waterways, including areas of open water, and that all land within the plan area is privately-owned. A detailed determination of ownership of the state, including any political subdivisions of the state, would be made for each particular plan.

4.8.4 Real Estate Cost Estimates

Cost estimates include the estimated value of the LERRD's. The Federal appraisal method has been used to estimate the value of the LERRD's**,** including oyster leases, as State law provides that "compensation for the taking of property rights affected by coastal wetlands conservation, management, preservation, enhancement, creation or restoration activities shall be governed by, and strictly limited to, the amount and circumstances required by the Fifth Amendment of the Constitution of the United States of America." La.R.S. 49:213.10.B. To account for changes in the future, the real estate cost estimates include a 50 percent contingency, which is found to be reasonable. The decision was based on the uncertainties associated with the study such as future design changes; areas that have not been identified yet such as mitigation areas; borrow sources beyond those of the Gulf of Mexico, the Mississippi River, and the Calcasieu River; and access locations for dredged material disposal pipelines; unforeseen severance damages; possible cemetery relocations; the impact, if any, of project footprints on mineral exploration and/or extraction rights; settlement of possible land reclamation rights, if allowed as project costs; and unknown court awards. In addition, the estimated number of the landowners is based on outdated ownership Tobin maps, many of which were last updated 40 to 60 years ago. Other costs included are contracting side-scan sonar for oysters, oyster report review, mapping by contractor, review of contractor mapping, title binders, intermediate certificates, final title insurance policy, temporary permits, review of plans and specifications, title review, appraisals and appraisal review, negotiations, field trips, meetings with landowners, reimbursement for relocation expenses for displaced persons, e.g., moving of personal property and reestablishment expenses for eligible businesses (PL 91-646), crediting, estimated percentage for condemnations, review of acquisitions by non-Federal sponsor, and administrative

costs such as coordination with engineers, project management, contractors, and contracting division, drafting/mailing letters, estates, just compensation letters, deeds, etc.

4.8.5 Navigation Servitude

Derived from the Commerce Clause of the U.S. Constitution, article I, section 8, clause 3, the navigation servitude is the dominant right of the United States to use, control and regulate the navigable waters and submerged lands thereunder. The applicability of the navigation servitude depends on both legal and factual determinations. If the legal determination supports assertion of the navigation servitude, then the second step is to determine the geographical area over which the servitude can be asserted. In tidal areas, the servitude extends to all lands below the mean high water mark, whereas in non-tidal areas, the servitude extends to all lands within the bed and banks of a navigable stream that lie below the ordinary high water mark. For planning purposes, the real estate cost estimates do not consider the effect of the navigation servitude, given the extensive technical analysis required for such a factual determination. The navigation servitude would be asserted where restoration is related to navigation. This includes new restoration feature opportunities or projects as well as modifications to existing projects.

4.8.6 Public Law (PL) 91-646 Relocations

Title II of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, PL 91-646, as amended, would apply if the project displaces any residences, businesses, or farms. The assumption taken at the time of plan preparation was that minimal displacement would occur.

4.8.7 Habitable Structures

Historically, coastal Louisiana has a rich tradition of hunting, fishing, trapping, and waterfowl activity. Recreational type camps, often consisting of crude structures accessible only by water, are scattered throughout the marshes. Because of the low elevation, tidal influence, and susceptibility to hurricane damage, the camps are placed on stilts or otherwise raised. For many of the proposed plan areas, the restoration features, such as the flowage of water and sediment, study results indicate that the camps would not be adversely impacted, given the level of flowage in which case the existing camps within such areas may be allowed to remain. However, camps may not be able to remain in areas in which there are adverse impacts to the camps such as, but not limited to: camps located within the rights-of-way for channels, pipelines, or levees; camps that due to changes in elevation of the surface water become uninhabitable or unsafe; or camps that can no longer be accessed due to plan features. A case-by-case analysis of existing camps would be made prior to the initiation of real estate activities. For purposes of the real estate estimate, it is assumed that existing habitable structures, including camps, would be allowed to remain within the plan areas, except in areas where fee title must be acquired or where the habitable structures would be directly impacted by a plan feature, e.g., within a new channel or levee. New habitable structures may be allowed within the plan footprints, provided they do not interfere with the construction, operation or maintenance of the plan. Owners would need to obtain prior written approval from the U.S. and the non-Federal sponsor for construction of new camps/habitable structures in the plan area. In addition, all

camps must comply with Federal, state, and local laws, e.g., section 404 permits under the Clean Water Act. Camp owners would also be required to hold the Government harmless from damage or injury relating to the plan.

4.8.8 Relocation of Roads, Bridges, Facilities/Utilities, Towns, and Cemeteries

Based on available information, a preliminary list of possible relocations has been prepared. Relocations consist of pipelines, roads, bridges, and utilities. Relocation of towns is not planned. It is not known if cemeteries would be within the rights-of-way of the plan. Determinations of compensability would be prepared for each report. For planning purposes, it is assumed that the facility owners would have compensable interests in their respective facilities. Costs associated with the subordination agreement are included in the real estate cost estimate.

4.8.9 Minerals

Under Louisiana law, a landowner does not own oil, gas, or other minerals "occurring naturally in liquid or gaseous form." However, the owner does have the exclusive right to explore and develop the land for the production of minerals. A landowner cannot transfer the mineral estate independent of the surface property, but the owner may lease the right to produce the minerals. The owner may also convey a mineral servitude to another, thereby giving that person the right to grant a mineral lease. It is common practice in Louisiana for a landowner to reserve a prescriptable mineral servitude for himself when he sells a tract of land to another. Between private parties, if a mineral owner does not exercise the right within ten years, the servitude is extinguished for "non-use," and reverts to the then surface owner. This "prescription of non-use" does not apply, however, in instances when the United States or the State of Louisiana, or any subdivision or agency of either, acquires property but reserves the mineral interests to the landowner. La R.S. 31:149. This statute allows the prior landowner to enjoy the right to minerals in perpetuity.

Mineral rights would not be acquired. The estates would expressly reserve to the landowner all mineral interests. Although the mineral interest owner would be allowed to continue ongoing mineral activities, in some areas there may be prohibitions or restrictions on future use of the surface of the property for mineral purposes. Alternative drilling methods may allow access to the minerals, e.g., via directional drilling. Specifically, in areas where fee title would be acquired and where permanent features would preclude surface access, e.g., channel or levee easements, the estates would expressly prohibit surface exploration or extraction. In other areas, the estates would restrict, rather than prohibit, the surface use, and would require prior written approval by the Corps and the non-Federal sponsor for mineral activities on the surface. Such approval would be granted if the surface activity does not interfere with the construction, operation, or maintenance of the project.

If it is not feasible for a landowner to use alternative methods to extract minerals, the landowner might try to assert a takings claim. This assertion might be contingent upon the size of the ownership and the area impacted by the project. At present, there are insufficient funds

and time to identify possible locations of mineral deposits and the size of ownerships impacted by the plan. During the Feasibility Report Phase, when a more definitive plan footprint in known, ownership research would be conducted to determine the presence of existing mineral leases and to quantify the impact, if any, of the plan alignment upon those leases.

It is assumed that remote access to the minerals would be feasible, e.g., via directional drilling or other methods. However, as for any outstanding third party mineral interests, releases or subordinations would be secured from these mineral interest holders, to ensure acknowledgment of these future surface use restrictions. The real estate costs include sufficient funds to cover negotiations with outstanding third party mineral interest holders.

4.8.10 Ownership of Accreted and Emergent Lands and Mineral Rights

The State claims ownership over navigable water bottom, including areas over which land had historically been located but where such lands have been submerged through erosion or subsidence. Pursuant to Article IX, Section 3 of the Louisiana Constitution, owners of land contiguous to and abutting navigable waters, bays, arms of the sea, the Gulf of Mexico, and navigable lakes belonging to the State shall have the right to reclaim or recover land lost through erosion, compaction, subsidence, or sea level rise occurring on or after July 1, 1921. Such private efforts to reclaim or restore lost lands can be made at any time. Coastal restoration projects implemented pursuant to R.S. 49:214.1 et seq. (Act 6, Louisiana Wetlands Conservation and Restoration Act, 1989) might, if successful, impinge upon those private reclamation rights. Accordingly, R.S. 41:1702.D (2)(a) provides that LDNR may enter into negotiated boundary agreements with such disaffected landowners to address the anticipated loss of their ownership and reclamation rights in the area of the proposed plan where the creation of land is anticipated.

In most cases, the State is not asserting or claiming ownership in subsided interior marshes. As such, the appropriate estate(s) would be acquired in these areas to allow restoration and conservation activities over not only on the submerged lands, but also on any emergent lands.

By contrast, in other areas of open water, the state claims ownership of the water bottoms. The LDNR w provide the real estate interests necessary for construction, operation and, maintenance, repair, replacement, and rehabilitation of a project, including such water bottoms. In the event that land emerges from water bottoms claimed by the state, the state acknowledges that the previous landowner may attempt to claim that it was deprived of its reclamation rights to the emergent land. The state believes that the value of such a reclamation rights, if there is any, is too speculative to assess. If a landowner raises a reclamation issue, the state would handle such a claim on a case-by-case basis. The state has asserted that a specific claim may be denied on the basis of lack of evidence of value, or, if warranted by the circumstances, compromised pursuant to rather complex legal provisions. LDNR has proposed that it be afforded credit towards its cost share for any costs it might incur in asserting ownership over emergent lands. This proposal would have to be consistent with all of the obligations of the non-Federal sponsor, especially the LERRD and indemnification obligations. The real estate cost estimate does not consider these possible future costs.

4.8.11 Timber Activity

It is the general intent of the plan to reserve to the landowner the right to harvest timber. In areas where timber harvesting is prohibited, the market value of the timber is included as part of the overall estimate of land value based upon comparable sales of woodlands. Otherwise, the estimate of value includes an estimate of compensation for the adverse impact of the project on timber.

4.8.12 Row Crop Activity

It is assumed that landowners would be allowed to harvest mature crops prior to construction of the plan. In that instance, compensation would be for the impact of the easement on the value of the property. If time constraints do not permit the landowner to harvest crops, the landowner would also be compensated for the market value of the crops.

4.8.13 Valuation and Acquisition of Existing Oyster Leases

The construction and operation of the plan may require the acquisition of oyster leases in many areas throughout coastal Louisiana. The LDWF leases State of Louisiana water bottoms for oyster production for $2.00 per acre per year plus survey fees, for a 15-year initial term, which gives the leaseholder the exclusive right to harvest oysters within the leased area. There is no midterm termination clause. For oyster leases located within the projected impact area of a coastal restoration plan, at the end of its current lease term, a lease may be renewed for a term between 1 to 14 years as a bobtail lease under La R.S. 56:428.1. For an operational project, La R.S. 56:428.2 provides that an oyster lease may be renewed for a one-year term, if the leaseholder stipulates that the waterbottoms under lease are capable of producing oysters.

An oyster lease has been recognized as a real estate interest by both statute and case law. The state would therefore get LERRD credit for the acquisition of oyster leases within the plan impact area, including incidental costs, in accordance with the PCA and Chapter 12, ER 405-1-12.

The LDNR has indicated that for LCA it would acquire oyster leases anticipated to be adversely impacted by a project. With acceptance of payment for an affected lease, the lessee would execute a purchase agreement with the State of Louisiana and a receipt, release, indemnity and hold harmless agreement in favor of the United States, including the USACE, and the State of Louisiana, including LDNR and LDWF, indicating that full and fair compensation has been made in complete satisfaction of all claims against the state and the U.S., related to past, present, or future damages to the affected lease. The state shall be afforded credit in accordance with the PCA and Chapter 12 of ER 405-1-12.

Depending on the plan schedule, the oyster lessee may be allowed to harvest the oysters at his own expense. However, if the plan schedule prevents the oyster lessee from removing the oysters, then the lessee would be compensated for the oyster crop. The lessee would not be allowed to harvest the crop if payment has been made for the oysters. Under the Federal method, no payment would be made for loss of future crop. Compensation for the oysters would be

limited to the contributory value of the crop. Real Estate costs include the costs associated with oyster lease acquisition.

The state would be obligated to provide real estates as necessary for the construction, operation, and maintenance, repair, rehabilitation, and replacement of a project. As such, the state must acquire existing oyster leases anticipated to be adversely impacted by a project, and the state must not enter into any new oyster leases or operational or bobtail leases within oyster impact areas.

4.8.14 Induced Flooding

If a taking is determined from increased water levels, a flowage easement would be acquired.

4.8.15 Zoning Ordinances

No application or enactment of zoning ordinances would be proposed in lieu of, or to facilitate, acquisition.

4.8.16 Acquisition Schedules

Acquisition schedules would be prepared for each feasibility report.

4.8.17 Landowner Concerns

Attitudes of landowners within the study areas would vary. Some landowners would be totally in favor of the plan, while others would be totally against it or components thereof. Public access over certain features may be an issue for private landowners. The most vocal group thus far has been the oyster fishermen. Although they understand that the project would be beneficial to the oyster industry in the long run, they are concerned about the impact of their individual businesses in the interim. Some fishermen have been in this business for generations and have invested much in their leased sites. Some landowners are also concerned about a plan's potential impact on existing camps and on new camp construction, as well as possible impacts on minerals.

4.8.18 Operation and Maintenance

The operation and maintenance for this plan would consist of OMRR&R of the structures, channels (other than existing navigation channels), and other project features. The non-Federal sponsor would have the OMRR&R responsibility.

4.8.19 Real Estate Costs

Table MR 4-20
Summary of Real Estate Costs for LCA Plan Components

Conditionally Authorized Features:	
MRGO Environmental Restoration Features	$ 4,214,000
Small Diversion at Hope Canal *	$26,383,000
Barataria Basin Barrier Shoreline Restoration, Caminada Headland, Shell Island	$15,558,000
Small Bayou Lafourche Reintroduction*	$12,590,000
Medium Diversion with Dedicated Dredging at Myrtle Grove*	$78,990,000
RE Subtotal:	$137,735,000
S&T Demonstration Program: (Costs captured within total $100 million program request)	
Marsh Restoration and/or Creation Using Non-Native Sediments	$3,300,000
Marsh Restoration Using Long Distance Conveyance of Sediments	$3,575,000
Canal Restoration Using Different Methods	$5,500,000
Shoreline Erosion Prevention Using Different Methods	$5,500,000
Barrier Island Restoration Using Offshore and Riverine Sources of Sediments	$5,500,000
Additional Demonstration Projects	$4,125,000
RE Subtotal:	$ 27,500,000
Beneficial Use of Dredged Material Program: (Costs captured within total $100 million program request)	$12,039,000
Congressionally Authorized Features	
Multi-purpose Operation of Houma Navigation Canal (HNC) Lock	$15,035,000
Terrebonne Basin Barrier Shoreline Restoration, E. Timbalier, Isles Dernieres (SP3)	$ 9,175,000
Maintain Land Bridge Between Caillou Lake & Gulf of Mexico	$ 892,000
Small Diversion at Convent/Blind River	$41,138,000
Increase Amite River Diversion Canal Influence by Gapping Banks	$ 1,494,000
Medium Diversion at Whites Ditch	$33,046,000
Stabilize Gulf Shoreline Stabilization at Pt. Au Fer Island	$ 272,000
Convey Atchafalaya River Water to Terrebonne Marshes	$38,598,000
Modification to Caernarvon diversion	$15,650,000
Modification to Davis Pond diversion	$52,800,000
RE Subtotal:	$208,100,000
LCA PLAN Total Real Estate (RE):	$385,370,000

* Diversion sizes: Small diversion: 1000 cfs - 5000 cfs; Medium diversion: 5001 cfs - 15000 cfs; Large diversion - > 15000 cfs

4.9 VIEWS OF THE NON-FEDERAL SPONSOR

The State of Louisiana has expressed an understanding of the current law and administration policy regarding implementation of Federal water resources projects. In a letter of intent dated June 3, 2004, Governor Kathleen Babineaux Blanco expressed the State of Louisiana's intention to share in the costs of implementing the recommendations of this report (attachment 4 NON-FEDERAL SPONSOR NOTICE OF INTENT). That letter referenced several outstanding issues that would need to be addressed prior to program implementation, and those issues are detailed in this section.

4.9.1 First Phase of Program Implementation

Because of the urgent need for Federal action to address the rate of land loss and the scale of effort necessary to sustain this vital landscape, the state believes that the near-term plan [course] of action presented in this report is a necessary first step in the restoration of the Coastal Louisiana Ecosystem. The state would like to emphasize, however, they see this first step in the context of a long-term, comprehensive effort that would require continuous Federal and non-Federal support. This first phase of implementation is an opportunity to begin construction of projects in areas of most critical need, to provide the sustained level of science and technology needed to support the scale and complexity of restoration activities, and to provide the tools and data required to support the continued effort. The state believes the plan should be updated as new circumstances arise, especially as long-term studies recommended in the report move toward completion and into the next phases of restoration.

4.9.2 Streamlined Implementation Processes

While it is important to maintain checks and balances to ensure wise and efficient use of resources, it is also important that program requirements do not preclude a timely response to this urgent problem. The state believes the USACE should develop procedures for preparation and submittal of streamlined decision documents. These procedures should include expedited mechanisms for incorporating projects that have undergone extensive engineering and design efforts under other state and Federal programs. These decision documents should provide adequate assurances that the projects would be effective and cost-efficient in meeting their objectives, but should not be traditional feasibility reports. In addition, these projects should be justified solely on National Ecosystem Restoration benefits; ancillary economic impacts and benefits should be reported.

The conditional authority recommended in this report for construction of five near-term critical projects is a good example of streamlined implementation. All of these projects meet the criteria specified in the President's FY 2005 Budget Request—they address some of the most critical needs in the Coastal Louisiana Ecosystem and are implementable in the very near-term. In addition, implementation of similar projects through other Federal and state programs has proven that the technology utilized is effective and cost-efficient in meeting the ecological goals of the restoration program. Incorporating and completing the extensive scientific and technological analysis already accomplished for these projects under other Federal and state efforts provides for the most expedient mechanism to address these identified critical needs. The

state believes that the preparation of decision documents on these five projects has proceeded to the point where it is possible to begin budgeting construction funds for them, and urges the Corps to update their budget projections for Federal Fiscal Years 2006 and beyond to include sufficient funds to support timely implementation of the report recommendations.

4.9.3 Program Implementation Cost Share

Although current law requires a cost share ratio of 65 percent Federal, 35 percent non-Federal for construction of ecosystem restoration projects, with operations, maintenance, monitoring, repair, replacement and rehabilitation being 100 percent non-Federal responsibility, the state believes that alternative cost share scenarios are appropriate and justified. The state is requesting the non-Federal share of total program implementation be set at 25 percent, including operations, maintenance, monitoring, repair, replacement, and rehabilitation costs. Much of the need for restoration can be tied to disruptions of natural processes caused by implementation of existing Federally-authorized projects, which were built under different cost share ratios. Without modification of these projects, further decline of the coastal ecosystem is a certainty. In addition, the nation derives significant benefits from the coastal Louisiana ecosystem: protection for the production and transport infrastructure for about 30 percent of the nation's oil and gas supply; the Nation's second largest commercial fishery; and navigation and port facilities which together support America's number one port complex by tonnage. If the land loss is not addressed aggressively, there would certainly be National impacts as well, not the least of which is putting the country's energy security at increased risk. Past precedent also shows that Water Resources Development Act projects to restore the coastal Louisiana ecosystem have been implemented at a 25 percent non-Federal cost. In addition, similarly to provisions in the Comprehensive Everglades Restoration Program, the state believes that it should be allowed to deviate from its cost share percentage for individual program elements as long as the required share of total costs for program implementation is provided.

4.9.4 Credit for Non-Federal Work In-Kind

The State of Louisiana has developed extensive expertise in the planning, engineering, and design (PED) and construction of coastal restoration projects through the Coastal Wetlands Planning, Protection, and Restoration Act and other Federal programs. Current Federal law and policies, however, preclude allowances for work-in-kind (WIK) performed by the non-Federal sponsor in the PED and construction phases of project implementation. The state requests that the state be authorized to perform WIK during the PED and construction activities pursuant to implementation of the LCA Plan, including, but not limited to, S&T Program demonstration projects.

In addition, the state requests that WIK credit be allowed to carry over between LCA Program components, provided that provision of WIK, cash, and LERRDS fulfills the total non-Federal obligations. Both of these allowances would permit the state to better manage the non-Federal obligations and provide for expedited and flexible program implementation. The state believes these views are consistent with the programmatic rules and allowances currently governing implementation of the Comprehensive Everglades Restoration Program.

4.9.5 Monitoring and Adaptive Management

Monitoring of the overall functioning of the ecosystem would be needed to facilitate engineering, design, and operation of program features. This monitoring is different, and potentially more costly, than monitoring specific projects for performance. Under current USACE regulations, monitoring is limited to one percent of project cost and has a limit of five years, and adaptive management costs are limited to 3 percent of project costs. Both of these regulations are tied to implementation of specific projects, and may limit our ability to continually improve program and project outputs if applied to monitoring and adaptive management of the LCA Program. The state requests that these limitations not be applied to implementation of the LCA Program.

4.10 RECOMMENDED CREDIT FOR NON-FEDERAL WORK-IN-KIND

For ecosystem restoration projects, the non-Federal sponsor is afforded work-in-kind credit for studies, but not for planning, design, or construction. Given the scope and nature of the LCA Plan, the demonstrated successes resulting from the current collocation team at the District, and the opportunities to utilize the knowledge base in Louisiana, it is recommended that the non-Federal sponsor be afforded credit for the value of the following work-in-kind:

1. Feasibility level decision documents conducted for conditionally authorized features, estimated at 50 percent of study cost expended within the first ten years of authorization;

2. Academic and field research to support the Science and Technology (S&T) Program estimated to be 35 percent of the S&T Program costs within the first 10 years of authorization; and

3. Study costs associated with investigations, regarding the large-scale, long-term concepts identified in the LCA Plan as requiring detailed study, estimated to be 50 percent of the study costs within the first ten years of authorization.

Credit for such work-in-kind would require approval by the Secretary of the Army, based on the Secretary's determination that such work-in-kind is compatible and integral to the project and the costs of such work are allocable, allowable, and reasonable. The total amount of work-in-kind credit shall not exceed the relevant component non-Federal share, and there shall be no reimbursement for the value of work that may exceed the relevant component non-Federal share. Credit for work-in-kind granted for one component cannot be carried over or applied to a different component.

Crediting for the above items is allowable only for work-in-kind that occurs after the signing of the appropriate agreements.

When the non-Federal sponsor requests credit for work-in-kind services, the source of any funds not originating from the non-Federal sponsor must be identified.

Credit for work-in-kind would be evaluated based on the provision of documentation by the non-Federal sponsor. The non-Federal sponsor must identify all funding sources not originating from the non-Federal sponsor. All such documentation would be thoroughly reviewed by USACE to determine reasonableness, allocability and allowability of costs. Upon completion of this review, a financial audit would be conducted prior to granting final credit.

The credit afforded to the non-Federal sponsor would be limited to the lesser of the following: (1) actual costs that are auditable, allowable, and allocable to the relevant program or (2) USACE's estimate of the cost of the work allocable to the program had USACE performed the work.

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